

AVIATION WEEK

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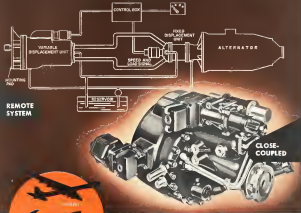


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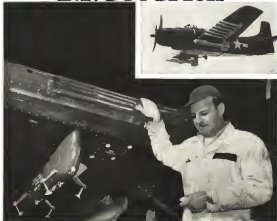


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By Cable . . .

First Report on 'Exercise Cirrus'

AVIATION WEEK'S Dave Anderson was the arch correspondent of a U.S. aviation business magazine covering "Exercise Cirrus," the joint air maneuvers in Europe that ended last week. While the jets were still scripping the final strains, Anderson called the following preliminary analysis.

► **Headquarters, Allied Air Forces of Central Europe, Farnborough, France**—The focus of eight nations participating in Exercise Cirrus, large-scale air maneuvers concluded Sept. 30, were turning now to specific air-to-air integrated forces. And according to Lt. Gen. James Norstad, USAF commanding officer in Central Europe who commenced the three-day exercise, the tempo was heated well.

Norstad emphasized especially that the major aim of Cirrus was to point out weak areas and deficiencies of an integrated force and the direction of future activity.

He said the maneuvers were not designed to test capabilities of pilots and planes, but to check the integrated chain of command, international control and reporting of its location, joint operations with NATO ground forces and flexibility of operations at target.

► **To Iron Outlines**—To those ends, the air forces of the U. S., United Kingdom, France, Belgium, Holland, Denmark, Norway and Italy were subjected to the three-day period. The area covered included all the European continent west of the Iron Curtain between the German-Dutch coast and the Swiss frontier-Dijon LaFayette line.

Basic assumption for the exercise was that relations had been deteriorating the past two years between Rheinland-Westfalen Germany, Holland and North-East-France Germany, enemy.

During that period, it was alleged that Rheinland was preparing aggressive. Rheinland exhibited an efficient controlled land force as defense and backed on time. The Sage, J. Rheinland kept up a constant ground offensive supported by tactical air, starting an unrelenting war. These forces drove to the Rhine River at the beginning of Operation Cirrus. Rheinland's air and ground forces were bottled to a limited degree. Air headquarters, radar and communications were laid out by Red tactics and air.

An air exercise opened Rheinland ground forces were about to jump off on a counter offensive across the Rhine, between Cologne and Strasbourg. This was counter force, a joint U. S. French maneuver for which Cirrus provided ground support.

► **Weather**—Red-French detailed analysis of weather reports, no general forecast was made. The exercise was efficient at the exercise or across of Rheinland forces as supporting target. But Gen. Norstad, in a press briefing the morning following conclusion of Cirrus, pointed particularly in this. Weather, he said, interfered with operations as much as the game plan, which was carefully studying of maneuvers because of bad flying conditions.

But this was an unexpected advantage because it provided checks on the functioning of command but weather equipment. Despite the weather, ground air activity appreciated that expected. Communications were well and operating airplanes were satisfied.

► **Radio Field**—One of the most impressive aspects of the maneuvers, said Gen. Norstad, was the amazing improvement in air-to-air construction. Cirrus had 15 air bases, all long enough to handle jets and with adequate weapons. This contrasted with Exercise Gibraltar last June, whose runways were short and weapons inadequate.

Norstad had high praise for the French squadron at Colbiac. Within one minute and action seconds after the scramble order, the first element of two planes was in the air. Within eight minutes the entire squadron was in the air. Within one minute and action seconds after the scramble order, the first element of two planes was in the air. Within eight minutes the entire squadron was in the air.

► **Integration**—By an of operations were well. Cirrus were given 24 hours within the time slots. They were required to make the change by an hour (about 10:00). USAF C-47 and C-47s and Belgium C-47, available to support.

► **Integration**—The radar network had been well. Only one out of 28 planes was destroyed. Grounding, was given 30 planes, 1 was Belgium. German completely covered with jets but only reported in the middle of landings. Results were very good.

Norstad said that the exercise was well planned. Because of replacement cost, it was not desirable to run an aircraft across flight and not the game. So in some cases planes were hand-crafted from troops to disposal points.

It is difficult to put an overall approval on Cirrus for several reasons. One, the exercise was a test of the exercise. There were no competing jets, no jet losses and, no serious damage to planes. Two, the exercise was well planned and well executed. Three, the exercise was well planned and well executed.

► **Three, there was no complete index of losses and loss or damage assessment was not made.**

► **Four, the game never reported the most serious effort of the real thing.**

► **Five, the exercise was a test of the exercise. There were no competing jets, no jet losses and, no serious damage to planes.**

The real aim of Cirrus, however, was to test the ability of the exercise to handle the exercise. The exercise was well planned and well executed.

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NEWS DIGEST

DOMESTIC

Paul V. Shultz stepped as chairman of Carter-Vincent Corp. 1 hour and has been succeeded in this post by Ray T. Fisher, C.V. president, who will hold both offices. Shultz will continue as chairman until the end of the year, will then devote more time to his investment banking and other interests.

Thompson Products, Inc., Cleveland, has purchased American Research Lab. Columbus, Ohio, and named Robert Jacques, former head of the laboratory, as chief of Thompson's newly formed Electronics Division.

American Airlines' 735 stewardesses have received a \$20-42 monthly increase under terms of a new annual team contract covering wages and benefits. Team agreement reached by AA and the Air Line Stewards and Stewardesses Assn. The increase is subject to approval by NLRB and is retroactive to Aug. 1.

Gen. Gen. Howard E. (Pete) Quarles retired from active USAF duty after 38 years of service. He is 67 years old. Gen. Quarles' latest assignment was director of a series of atomic tests at Ft. Greely. It has been reported that he has differed with top officials on the use of tactical air power.

Rep. Gen. Mark E. Bradley, Jr., is expected to be promoted to Director, Procurement and Industrial Planning, of the Air Materiel Command. He has already been nominated as a major general. Rep. Gen. Nelson S. Tamm is due to be promoted to deputy senior Gen. Bradley.

FINANCIAL

Northwest Airlines has declared a full year's dividends of \$1.13 per share, up from \$0.95. The company's cumulative profits, totaling up to \$100 million, previously declared quarterly dividends of 25.75 cents each and adding the fourth quarter dividend of the same amount. All dividends will be paid Nov. 1 to holders of the stock as of Oct. 19. 1978's reported a net loss of \$1,614,136 in the first quarter of the year, but profits in April, May and June covered the loss and resulted in net earnings of \$17,153 for the six months ended June 30. Net earnings in July were \$359,545 and in August \$314,150.

INTERNATIONAL

SIAD/Machete's, parent Italian aviation firm has been liquidated less than a month after another collapse, 1978, closed down its aviation department. Five factories were involved, employing approximately 4,500.

British European Airways last Airport Authority went into preliminary action Stage 1 carrying some 500 passengers on the Paris run in three days. Cabin conditioning system broken to prevent interior on daily runs.



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In the last several months TEMCO has been selected by Boeing, Douglas, Lockheed and Martin to build major assemblies and components for their newest military airplanes.

The T-35 Buckaroo was completely designed and developed by TEMCO. It is now being tested by the Air Force as a trainer and by the Ground Force as a highly maneuverable support weapon.

TEMCO has the experience, TEMCO has the facilities—and TEMCO has the administration that assures their proper application to Aircraft.



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WHO'S WHERE

In the Front Office

John A. Minardi, Jr., and Clyde Williams
have been named vice presidents of Truax
Engineering & Mfg. Co., in charge of new
designing and as computer, respectively.
Both men are members of the regional group
who started with Truax in 1965, and both
served in the Truax division of North
American Aviation during the last war.

John W. Belongue has been named a vice
president of General Electric and also an
assistant manager of the company's new De
Levee Products division. Nicholas M. De
Chassis has also been designated a vice
president of GE. He was recently placed in
charge of the Manufacturing Services di-
vision.

What They're Doing

Dr. James R. Cox, formerly an engineering
consultant for Douglas Aircraft, has
joined the J. E. Cox Co., Inc., to de-
velop and make automatic control systems.
A former Douglas research engineer, Law-
rence R. Stumpf, has joined the new com-
pany as automation engineer and new
man manager. The firm is located at 11401
Wilshire Blvd., Los Angeles.

Allen R. Simons has been designated
field service manager for Chance Vought
Aircraft. Henry E. Kott is the company's new
contract administrator and has been as-
signed Thomas F. Seymour. Dale Martin
is Vought's new chief industrial engineer.
John W. McLaughlin has been made chief
test pilot.

George A. Page has been appointed di-
rector of research and engineering for
Aerovox Mfg. Co. H. V. Rasmussen
has been named executive engineer for
Worcestershire Pump & Machinery Corp.
at Waterville, N. Y.

One addition has been designated assistant to the
manager of various operations, engineering and
manufacturing of Minneapolis-Honeywell
Rapidox Co. Also, Everett Welch has been
named administrative assistant. Carl Kline
has been promoted to assistant director
of the service engineering department.
George Smith, formerly head of chief field
service engineer, and Neil O'Neill has been
named chief of the propeller section.

David A. Grogan has been appointed
director of Transportation "Air Line" new di-
rector of public relations and advertising.

Honors and Elections

Defense Secretary of the Philadelphia
Economic Magazine has been named to the
board of Philadelphia Air Lines. Other new
members are Labor Secretary Joe Pignone,
Health Commissioner Ruggia Polina and
Laborer Maps. The latter is an acting
representative.

INDUSTRY OBSERVER

►Hudson Motor Co. has completed large subcontracting agreements to
build forward fuselage assemblies for the Boeing B-707 bomber for Boeing
Wichita, and for the B-47 bomber for Douglas Tulsa, using
mechanical parts capacity that will be available at the Canton, Detroit,
body plant.

►F1. Worth centers on that the receiving Convair B-60 development
of the B-35 subsonic bomber is complete and ready for roll-out
except for completion of delivery of its eight Pratt & Whitney J57 turbo-
jet powerplants.

►A new Air Force competition for a medium jet bomber, which is now
in the works, may be a means of getting the new North Vietnam
fighter intercepting bomber into U. S. production. The Valiant has been
highly praised in U. S. military circles who have seen it at Ft. and Vietnam
in carrying on its active jet engines with USAF. Another possibility
might be as a modification of it on the Navy super carrier, since the
Valiant reportedly has a much slower landing speed than its principal
competitor, the A-10A B-47.

►Grumman Co. of Azusa has moved its co-sited GCA Model 2 heli-
copter to its new plant located at Flowerfield, L. 1, where it plans to
develop a helicopter manufacturing and research facility on a 300-acre
tract, with 10,000 ft. of manufacturing space now available.

►A number of foreign manufacturers have written CAA asking to obtain
plans for the AG-1 prototype CAA agricultural spray and dusting plane
designed by Fred Wick of Texas A&M College. CAA already has agreed
to make blueprints of the plane available to any U. S. manufacturer, and
some non-civilian companies as well as plane manufacturers already have
accepted the plans. But CAA does not intend to make its own agricultural
development available to possible foreign competitors of U. S. plane
manufacturers as long as there is indication that American companies are
interested in going ahead with the development.

►Convair XC-99, which recently set another new world record for
a single plane by carrying 90,000 lb. payload to Ft. R. Cobb, Cal.,
to Ft. Worth with a total gross weight over 320,000 lb., is being re-
equipped to a second in total pounds lifted. Before its modification it had
carried 15 million lb. cargo in 110 flight hours, and since it was modified
it has carried more than 300,000 lb. cargo in approximately 100 hr.,
making a total of approximately 23 million lb. lifted.

►Latest plans in order in the long-held Chance Vought Convair seem
to be a low level attack plane for the U. S. Navy, which has been designated
AU-1, fitted with a single-stage Pratt & Whitney R-2800-T14A engine,
reused of the two-stage version and in earlier fighter bombers. News
while Chance Vought also is planning to build a French version of the
Convair, designated F4U-7, under the Mutual Defense Assistance Program.
The attack designation of the AU-1, was assigned in a change after the
attack plane had originally been designated F4U-6 by the Navy.

►Assignment of 100 AFB, Utah, is scheduled for all F-44 defense parts
for the western half of the U. S., including Alaska and the Pacific, across
immediate shipment of some 200 millions of materials into the post from
other Air Force depots. Previously the base had also been assigned as
world supply station for the Northrup F-43 Scorpion interceptor.

►Although Air Force has not yet given delivery on its Douglas C-119A
transport until next summer, Navy has just taken delivery of its first
three Douglas B-60. One goes to Navy Fleet Logistics Air Wing VR-5
at Moffett, another to MATS at Moffett's VR-5 squadron and the third
is being retained by Navy at Douglas Santa Monica for Air Force tests. Both
military versions are similar to the commercial Douglas DC-6A cargo
plane.



Vickers Valiant

Farnborough Furlies:

Weak Production Handcuffs British Air

- Public turns out in great numbers to support the show, but supporting the industry is different.
- Labor isn't too eager for aircraft employment; wages are low and bonding is short.
- Yet, if prototypes can become production types, tomorrow should be a far better day.

By David A. Anderson

London, England—It's difficult to see the wealth Society of British Aircraft Constructors display on the spot at Farnborough. A casual observer is overwhelmed by the window-dressing of pilot staff, and the floral garlands of aircraft against the patches of blue sky. A casual observer is too aware that there are few new aircraft this year, and that these are prototypes, not production items.

Certainly a better environment for thinking about the display is the dingy galleries of a London museum, where you are far removed from the green fields and trees of Hampshire. And it is a pity if you have seen a few British fighters and talked to a few technicians on their home grounds after the novelty of the show has passed.

Then some of the pieces begin to fall into place, and the picture of British aircraft industry starts to take form.

It isn't too pretty a picture. Production, as we think of it, is small. Some aircraft are obsolescent, with few exceptions. Today's advanced prototypes are two to five years from liquidation status.

Light & Shadow

British aerial aviation is very weak, say observers. Jet fighter production for the first is far behind even the first stages of Vickers-Supermarine Albatross was activated only recently. And the London Daily Express, Lord Rotherford's paper, printed out-and-out headlines confirmed that expert reasons of the Vampires "for certain reasons" were powered with higher-thrust engines than those going to the Royal Air Force.

Public Support—Fortunately there is a brighter aspect. Everyone at Farnborough agreed that the prototype aircraft should be world-beaters, when

Special Report

David Anderson of *American Week's* engineering department is on special assignment to cover British and European aviation developments. From New York headquarters, he went directly to the SABC show at Farnborough. His first special report appeared Sept. 17. Here is another, at some delay.

they are in service. And public support of its power is stronger—stronger at the last public day at Farnborough was about 148,000.

Most support is considerably different from active support, however. What the aircraft industry needs most is the shot in the arm that would come from increased employment. Right now, the overall employment level is about at one tenth the wartime peak, and plant managers are concerned primarily with securing new labor.

In this they are hampered by several things. Aside from the casual intention of people to seek employment on what they consider a temporary position, there is little incentive offered Britain to go to work on an aircraft plant.

Wage rates are set on an industry-wide contract between management and unions, so that necessary adjustments are not. Housing is especially short in many of the defense areas. And govern-



Short SA.4

Hawker P.1067

ment direction of labor is politically unwise, if not impossible anyway.

In new materials, one of the other essentials to an expanding industry, Britain is finding an occasional crack. That has affected mainly the production of end types which, in spite of their export value to Britain's economy, must have a lower priority than fighting craft.

Factory space and facilities are some thing else. During the recent war, there were great numbers of "studios" built to build up the new aircraft industry at the end. These modern plants are being used only to partial capacity, and have great potential for expansion.

Machinists' tools are, of course, short. In one case, the Vickers-Supermarine factory at Southampton—there are large closed areas in the factory interior waiting to be filled with tools no longer from the United States. And this is typical of the industry.

Vinson's a Better Deal—This is all background which must be understood by those readers who claim the British aircraft industry is in French competition and say that Britain has a fine prototype air force.

Take, for instance, the Albatross is going to be difficult. At least two new plants of great sophistication—the Brewster P.1067 and the Vickers Valiant—have been ordered into production for the RAF on the drawing board. New types are being developed for the Royal Navy to extend the differences to present equipment.

All along the aircraft industry there is the feeling that "we must get moving" right on the ball, in America—with production of current and advanced types.

What are these types? Traditionally,

the British have been noted for fighters, fighters, two subsonic fighters like the Gladius Gladius, the Supermarine Spitfire and Hawker's new P.1067. And the last was given them intensive as presence in the development and production of modern single, heavy load bearers, typified by the Avro Lancaster.

Examples of both these classes of aircraft were what gave the evidence at Farnborough a picture of British aviation tomorrow. In the fighter category, there was most interest.

Fighters

Hawker P.1067—Without question this beautiful craft was the star of the show. In thinking speed (claimed to be around 500 mph during cruise) to go at the show's end, evidence was available, had the audience going. Aside from its propeller thrust and classic lines, there was little to be seen on the aircraft. So far, the system was taken for the first time, the new and the P.1067 spent its ground time behind a banner of the far side of the field, and, from the distance and the impact of the engine.

Points noted about the craft were its subsonic (the P.1067) passenger landing gear, its 15-sec. takeoff run, and its large wing area. It is also believed to have very heavy armament, something on the order of a quartette of 77 mm. cannons.

The plane, like practically every other new design in England, is powered by a Rolls-Royce Avon turbojet, currently tested below 7,000 lb. static thrust.

Vickers-Supermarine 355—This hot turbo-jetted Swift-Bonanza is now powered by two Avon turbojets mounted side-by-side in a wide fuselage. The British claim it to be the fastest and

most powerful current-based fighter in the world. It certainly should be the most powerful, but it may not be the fastest and it certainly is not yet carrier-based.

The plane has a straight wing to give good deck-handling characteristics. The wing is a thin wing, and has drop-down wing tips to aid the conventional landing flap, flap. Rate of climb, although not (officially) demonstrated in flight at the display, should be staggering with the power available. Armament is like the P.1067.

Present in prototype form only, the craft also spent its ground time behind the banner.

Vickers-Supermarine Swift—One big disappointment of the show was that the Swift, which is designated with the P.1067, could not appear. It had been belly-landed and was irreparably un-recoverable. In its place, last year's last-minute Type 535 showed.

The 535 is an even smaller, but it seemed considerably slower than the P.1067. One interesting phase of its flight demonstration was the use of ground flaps during some very tight turns.

Hawker P.1012—This little propeller plane was shown as a "modified" version, the low difference between it and last year's P.1012 being the fitting of a new engine. The P.1012 is a rough development of the Sea Hawk, one of the Royal Navy's current production types. It would seem that somewhere along the Sea Hawk production line, some wings could be introduced and the Royal Navy would have no certain fighter of excellent performance.

De Havilland Sea Venom (N.8.20) —Developed from the well-known Vampire, this all-weather fighter is to be developed for the Royal Air Force, Australia and France. It was described at low level by John Berry, whose memorable thing was one of the remarkable results of the show.

Aviation Week—N.8.4—This craft is one of the more serious of the home Albatross design (which was laid out as an Air Ministry specification of 1946) and is going into squadron service as a light fighter. The large scale of the prototype craft was flown, this year, a production reason was in the other section.

It was noted that century birds are now centered on the voyage instead of underneath the wing. These birds have vertical line on the nose rather than the tail to guarantee recovery. Four engines (approximately 2,000 hp) are being mounted and used with such force that the aircraft have a great deal of stability and it has a sharp nose this year.

To say which listing should be added two slowly moved fighters which failed to make the show. These are



SEEMS POINT to no easy solution at Wright, but picture is brighter elsewhere.

Strikes Tying Production in Knots

Aviation executives, concerned at the problems of expanding defense production, but wary were deep in the throes of another struggle that threatened to throw their finely geared schedules off balance—the swirling tide of labor disputes affecting nearly all segments of the industry from private manufacturers to suppliers. About two dozen firms had up approximately 900,000 workers after

CEO-affiliated unions went on strike, the major part of the reason. And for the incident list of the unions, Wright Aero received. Cessna, at Wood Rely, and Grumman, N. J., shut down nightly since Sept. 27, three seemed to be as early as two strikes, although Federal Aviation, Boeing and Frank Bowers were under orders to work day and night until the situation was straightened out.

More than 12,000 WAC employees went out since 9,000 production workers and approximately 5,000 other workers who contributed to the shutdown by refusing to cross picket lines. About 1,000 additional construction workers, affiliated with AFL, also rejected the pickets.

The major cause appeared to be the production workers' demands for higher wages, increased pension, and other benefits—yet the issue being debated in newspaper advertisements by each side was the new culture within at Wright, which the company wants installed by its outside industrial buying firm. The

union wants to be recognized as the bargaining agent for the entire construction employees.

Among the other firms working on knotty labor relations problems last week was:

- Pratt & Whitney Aircraft's Southton, Conn., plant, where 1,000 workers went out when UAW turned down extension of East Hartford's contract to cover the Southton facility. Progress for settlement here looked good early last week, when workers started trading back white towels and state credentials worked on the strike issue.

- Douglas Long Beach and Santa Monica, where a total of 8,100 workers have been out since Sept. 5 and Sept. 12 respectively. UAW here is asking automatic wage progression, but a payroll company offer of an escalator wage clause and straight hourly wage boost.

- EC Corp., at Ridgefield, N. J., when International Brotherhood of Electrical Workers threw up picket lines Aug. 14. Deliveries have been slowed because sympathetic Indians refuse to work over the lines.

- E-CO Corp., Detroit, Mich., parts and jet engine parts maker, which had about 3,000 workers out since Sept. 11, appeared to have reached a settlement last week, when workers were scheduled to strike in agreement

reached between the company and the union.

Other firms have successfully earned out wage bonds. At Rees Aircraft, a 4% increase went into effect for approximately 800 hourly paid and salaried employees and more bonds paid electrical maintenance workers. However, UAW CIO and the United Aircraft Workers union turned down the increase, indicating they were wary of accepting any bond which might jeopardize increases which may be negotiated when contracts are renewed this month.

Wage Stabilization Board cases recently appeared on approximately 17 cases heavily increase the 13,000 workers at Lockheed plants in the Los Angeles area. And Air Associates came out with a 12-cent-an-hour increase for some 1,000 employees at three plants in New Jersey, engineering the contract the company has with UAW-CIO Local 260. The board was satisfied by the results.

NAL Management Beats Opposition

While the opposition slate managed to place three members on the Board of National Airlines, the management group headed by G. P. Baker, won a clear-cut victory at the annual stockholders meeting held Sept. 27 (Aviation Week Sept. 10, 1951, p. 3) and Oct. 1, 1951, p. 19). Management's margin in the voting was about 2:1.

The management group elected eight members to the board and will elect five as a casual act of company policy. More importantly, all management proposals were adopted by stockholders. In the final vote the abolition of cumulative voting, which permitted the opposition slate headed by William K. Lewis, Jr., to elect three members to the board. At the next stockholders meeting, with the absence of cumulative voting, the arrangement will be as a position to name the entire board unless the opposition can muster considerably more power.

Jacobs has indicated that the result of the voting on cumulative voting will be challenged in the courts. But informed observers believe that this will prove to be a futile action.

Viscounts Canceled

Melbourne-Orders for six Viscount Viscount Viscount airlines have been cancelled by the American National Airlines Commission because the government has refused to permit licensees to enter the country duty free. ANAC has not yet decided on applications for the Viscounts.

WHY SODIUM COOLED VALVES LAST LONGER

FIG. 1

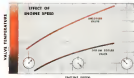
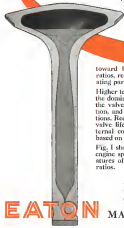
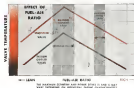


FIG. 2



The trend in modern engine operation is toward higher speeds and more economical fuel-air ratios, resulting in higher temperatures for many operating parts.

Higher temperatures of exhaust valves, for instance, are the dominant factor limiting valve life, sharply reducing the valve material's resistance to corrosion and distortion, and definitely limiting its life under fatigue conditions. Reducing valve temperatures, therefore, lengthens valve life amazingly; this is best accomplished by internal cooling as shown in the accompanying graphs based on recorded test data.

Fig. 1 shows effect of internal cooling of valve over the engine speed range. Fig. 2 shows lower valve temperatures of the sodium cooled valve for various air-fuel ratios.

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FINANCIAL

McDonnell Adjusted Operating Results

	Year Ended June 30	
	1994	1951**
Sales	\$13,648,143	\$47,623,014
Earnings after taxes	2,815,249	2,491,262
Earnings per common share	\$4.12	\$3.66

**As adjusted to conform to 1951 accounting method.

*As reported by company under changed accounting method.

Up or Down? It Depends on Angle

McDonnell accounting switch, including accrued earnings on undelivered work, distorts comparison with 1950.

With its fiscal year ending June 30, McDonnell Aircraft Co. is the first major aircraft builder to report its annual results for 1951. The company's annual report assumes added significance in that it shows a measure of results production for the first full year following the outbreak of the Korean war.

As reported to stockholders, McDonnell shows total sales of \$46,623,014 for the year ended June 30, 1951. Net earnings for the current year were indicated at \$3,291,262 or \$4.82 per share.

This is a substantial improvement over the 1950 fiscal year sales of \$35,625,333 and net earnings of \$2,415,219. However, the 1951 results reflect a major change in the accounting method used which distorts comparison with 1950.

Accounting Change—In the past, McDonnell did not include earnings on long-term contracts until completed units were delivered, with contributions being carried to account upon completion of the contract. With its 1951 fiscal year report, the company switches its current earnings account on a percentage-of-completion to work progress.

In other words, profits have been anticipated on contracts before all completed units were delivered. This change had the effect of increasing sales for the 1951 fiscal year by about \$14 million and net earnings after taxes by \$860,000.

The accompanying table shows the sales shown at McDonnell's 1951 results on the new basis as well as adjusted to the previous method to afford a like comparison with 1950.

It becomes evident that capital of 1951 sales having an indicated gain of

about 52% (sales at 72%, the measure was actually less than \$4 million and slightly more than 10%). Moreover, on an adjusted comparable basis, net earnings after taxes for 1951 were actually lower than for 1950—\$2,491,262 as against \$2,815,249.

Moreover, it is possible that faced by higher income taxes for 1951 as proposed by Congress, the McDonnell management decided to include as much earnings as it could during the period ended June 30, 1951, so as to benefit from the relatively lower corporate tax rates.

1951 Profit—It is very significant that despite the continuing build-up in aircraft production, actual production has been slow to show any appreciable gains. This is reflected by the very minimal gain of less than \$4 million to McDonnell's 1951 production over its 1950 fiscal year results.

This may well indicate a pattern to be reported in the 1951 annual reports of other aircraft companies. In fact, this trend has been pronounced in the most recent report released by a number of major builders. This condition is attributed to the delays incident to lead time in starting production on new aircraft designs. Many frequent monthly, however, have been industry reports of "slippage" in manufacturing aircraft production schedules.

Despite an more moderate gain in sales and lower earnings for 1951, as shown, McDonnell continues to report considerable progress. A better than average accomplishment is shown in profit margin with the 1951 adjusted figure being 5.41%, compared to 4.94% shown in the unadjusted sales. Under the new accounting method, for the 1950 fiscal year, ratio of earnings

after taxes to sales was 7.38%. For last year the industry average was slightly better than 7%.

New Facilities—A major change in the complexion of the company's assets also took place. McDonnell arranged to purchase from the City of St. Louis for \$5,873,093 the main portion of the plant at the Municipal Airport. Under the terms of the contract, the company paid \$1 million on July 31, 1951, and delivered to 2% note covering the balance which is payable in monthly installments over the next two years.

It is noteworthy that the company received a certificate of occupancy for the extent of 1950 on the purchase price of the plant. In other words, 1950, at the cost of the plant will be written-off within two years while payments will continue over a period of ten years.

McDonnell, in undertaking a fiscal year production capital expenditure of \$47,513,486. This includes the purchase of the plant from the City of St. Louis, a new \$15 million light tank large, and \$2 million for work under construction to increase cover the entire program.

On June 30, 1951, McDonnell's unfilled backlog amounted to \$270.6 million, the highest in its history. To help finance its production program, the company arranged for an \$11-million five-year bank credit agreement.

Net Worth—Consolidated net worth in the company's balance sheet position is evident in the gain of the net worth position to \$13,598,914 as of June 30, 1951, as compared with \$7,625,881 a year earlier. Stated in terms of the existing common stock, this gain is best expressed by the rise in the book value per common share from \$18.97 at June 30, 1949, to \$25.80 at June 30, 1951. Adjusting to remove the gain resulting from the current accounting method change would reduce the 1951 contribution to \$16,691,614. The effect of the company's two-for-one stock split of September, 1950, as reflected in the treasury ownership is noted. At June 30, 1950, there were only 1,186 stockholders. A year later that figure had increased to 2,395, at least double. Regular dividends of \$1.00 per share were paid on the common stock during the past fiscal year with the same quarterly distribution of 15 cents realized by the year.

Some dilution will occur when the president of the company exercises the remainder of his warrants at \$3 a share. A total of 35,468 shares will thus be added to about one-fourth the existing equity base.

There have been additional reports that McDonnell will seek to have the company shares listed on the New York Stock Exchange. The company has further developed investment interest in McDonnell Financials. —Selye Abshoff

AERONAUTICAL ENGINEERING

Joint Group Tackles Engineer Shortage

- Industry and military told what to do for future.
- But no immediate relief in sight for today's problem.
- So industry still can use over 50,000 more right now.

By Irving Stone

The critical shortage of engineers is sticking out like a sore thumb on the otherwise highly hot air American industry.

And the gloomy picture is that this shortage is going to get worse before it gets better—and it does in the next 10 years.

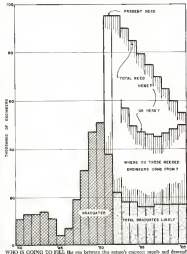
Probably the no other industry, the aircraft plant and allied plants are a widely diversified engineering group on comprising a broad field of specializations not only from an aeronautical category, but also from physics and the fields of mechanical, electrical, chemical and civil engineers. For the "smaller industry," therefore, the situation is especially acute (Aerospace Week May 7, p. 26).

The Engineering Manpower Commission of the National Joint Council gathered a group of industrialists, educators and engineers at Pittsburgh, Pa., last month to discuss what could be done to maintain and reverse the national supply of engineers for civilian economy and also for the armed services.

Fact New: The situation that confronted this commission is fairly set forth in the accompanying chart. This was contained in the Commission's Aug. 20 newsletter and summarized in the light of the latest looks at supply and demand and the steps to be taken to get government and industry engineering talent to better use.

The chart was prepared by C. S. Hallock from data compiled by the U. S. Bureau of Labor Statistics, U. S. Office of Education, American Society for Engineering Education, and the Engineering Manpower Commission. Hallock, a member of the Commission, and dean of Cornell's College of Engineering, presented a paper at the meeting, stressing in substance the new-looking data previously mentioned.

The graphs representation sweeps the past and probes the future. As Hallock points out, the operation of



the draft in the war years had the effect of taking all able-bodied men out of the engineering schools. Thus, during that time the schools were not educating engineers at the normal rate. Hallock claims that the U. S. was the only belligerent country on either side of the conflict that followed this policy. This means that men who should have been graduated in those years are simply needed in the present emergency—but they aren't available. However the G. I. bill helped boost the number of engineers graduated from the schools up to this point here.

Graduates that may be expected in the future—in 1950—can be closely estimated because those who will come out between now and 1956 have either entered or applied for admission in the country's engineering colleges.

High School Factor: Percentage of high school students now entering in engineering colleges is about 53% less than during the previous years. Hallock observes that it isn't likely there will be any substantial increase over the total number of engineering and engineering science graduates, because high schools aren't expected to boost by

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any legs around the numbers gods' shop, until the end of that race.

The numbers expected to graduate from engineering schools, as shown on the chart, is based on the total actual paid enrollment without allowance for draft or reserve withdrawals. Obviously, if engineering students are called into service, the graduate estimate will slide.

► Demand Exceeds Supply—Last June, the Commission published the results of a survey of industrial and governmental need for civilian engineers. This indicated that 58,000 were required as of June 1. An additional 15,000 were needed by the armed services. Shown on the chart, the total is 73,000. To meet this need was a class of 16,000 ADEL half of them, says Hollister, are or will be with the armed forces.

The need need not be a real liability to drop. Therefore, it may taper off, but how sharp the drop will be will depend on what active government and industry try to do.

These requirements, Hollister says, are in keeping with the industry pattern in which engineers are used. But the percentage of those beginning engineering studies is far below those needed before the war. Nearly 67% of boys graduating from high school are attending engineering colleges, now the rate has dropped to 43%. About 80% would be needed to meet postwar civilian needs alone.

Thus, the six patterns must be greatly modified if the present engineering task is to be done with the limited number available.

► Recommendations to Industry—This is what the Commission recommends for industry:

- Use engineers only in jobs in which engineers are required.
- Do not hold young engineers in "in tent" positions longer than necessary to qualify them.
- Move engineers to positions of maximum responsibility incompatible with ability and experience.
- Release engineers from positions not requiring engineering training.
- Recommendations to Military—The Commission's recommendations to the military:
- Engineering specialists are critical in growing positions as the defense effort should not be called to duty regardless of service status.
- Engineers should be assigned only to duties involving equity use of their technical training and experience either through the draft or the reserves.
- Reserves in related industry whose subsequent training qualifies them as engineers should not be called and used as related personnel, but only in emergencies which must be filled only by engineers.
- Reserve officers whose subsequent



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through

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training facilities; there is expansion should it be needed, be sought only to duties which require engineering training.

That's the conventional viewpoint for this emergency period.

► **Draining Power**—But there's another fact that many engineers believe hasn't received sufficient attention.

Should this emergency be resolved but another year in the next 20 years, it is doubtful if the engineering supply will be any less critical than it is today, considering the tempo of technological progress and the huge technical manpower required to translate these advances into economic mass production schedules.

The goal of the problem seems to many in the profession to be that of getting enough students into engineering colleges. In basic terms this means making engineering sufficiently attractive to the high school graduate on a professional and from an economic viewpoint.

Selling engineering as a profession may not prove difficult because it carries a strong appeal to the creative student in many young students. Another strong factor is the growing realization of engineering effort in the broad cross-section of consumer products in this country.

Selling the profession from the non-technical angle appears to be a shorthanded trick. This isn't true in today's market for engineers, but one frequently hears from graduate engineers and college students studying for other professions that "technical" experience in the field of engineering is not about available talent. Looking to technical manpower into other fields of work.

Talked down, a wide consensus among engineers in all forms of national emergency, they are preparing engineers in peacetime it's tough on a broad segment of three-potential and where we go.

► **Reliance**—From the viewpoint of emergency utilization, the aviation industry represents an extreme consumer of manpower.

It can't get enough technical help in periods such as these. But many engineers feel that it is "overvalued" then, when the industry isn't deluged with military contracts, its engineering manpower demands are relatively small.

What the picture will be after the emergency is highly conjectural. But government and industry planners can learn a lesson. They must make it possible, more difficult to absorb a steady flow of technical manpower into the peacetime phase of this progressive era if they expect to have a reserve when an emergency expansion hits them.

If a place with adequate competence is established, the world-be-engineer, like any other man, will go for it.

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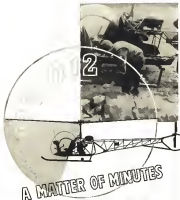
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... BY HELICOPTER

In Korea, blade wounded often result a hospital days from a rifle round victim in transportation crisis.

Combat records show that combat casualties have been evacuated by helicopter in a hospital or emergency hospital within 10 minutes after being wounded. This remarkable "ambulance" service is the contribution of helicopters such as the H-19 and the H-119, both by Bell Aircraft for the Army, Navy and Marines.

These maneuverable Bell helicopters are efficiently loaded with saving the lives of 3,000 wounded in 10 troops in 6 months.

The majority were wounded so critically that evacuation by any other means could have been lost.

While these helicopters have done almost the unbelievable, they are not robots. They need men in fly them. Army and Marine pilots continuously operating these helicopters dangerously close to enemy fire, or properly taking their own lives to help save the lives of others.

Bell Aircraft saving the application of multiple helicopter rescue.

BELL Aircraft
.....

'Beauty' Treatment For Stratojet's Skin

Boeing Aerospace Co. is making sure that aluminum alloy sheet used for the B-47 Stratojet's skin meets the high standard of aerodynamic characteristics required for this fast bomber.

It was no secret that skin imperfections could measurably cut the top speed of the modern jet aircraft, so Boeing wanted to assure that the skin coating of corrosion-resistant, non-pore aluminum on the aluminum alloy sheet would be protected from time of workhouse through to the end of the production line.

What was wanted was a skin covering that would resist surface damage from sliding one sheet over another, flying chips, heat-treat, deep drawing, pneumatic hammer operations, and other fabrication processes. Studies by Boeing's process lab and consultation with Minnesota Mining and Mfg. Co. resulted in Orange Dye No. 965—a liquid spray applied with a giant atomizer.

First coat of this plastic lacquer is made at the workhouse. New lacquer is applied below and after each manufacturing operation and the result is a final smooth skin. Removal of the lacquer is easy, the coating peeling off like tape.

Modified Camera Takes Dual Record

Mechanical and cine-photograph records may be made simultaneously of a subject under test by modifying Kodak or Eastman Type 35 high-speed cameras to take a second lens at 90 deg. to the normal lens. Both records are made on the same film.

Since the film trench vertically, the horizontal deflection circuit also is used. The film speed, selected by the edge-marking speed lamp in the camera, provides a time base if necessary. Exposure of the cine-photograph lens is controlled, and an open picture frame, the midpoint from top to bottom of the frame represents a time interval equal to the exposure of the picture film. The time base of the picture exposure rate.

The time may be placed any desired distance within the width of the picture field, where it will not conflict with the subject being photographed. An cine-photograph providing a total exposure potential of 10 ft. or higher is recommended for use with the camera.

The camera modification can be added to Kodak high-speed camera or Eastman high-speed camera Type 311 at a charge of \$500 plus cost of the extra lens.

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- 3) Take off and landing weights
- 4) Take off and landing speeds
- 5) Tire pressure—run and valve design
- 6) Official requirements

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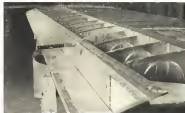
Silwatt is equipped to mold, extrude, punch, lathe and end-mill and can build precision rubber parts to meet SAE, AIA, AS-TiA and individual requirements as well as 58 specifications under MIL-R-2085 hyper-reading AIRCRAFT 20-11641.

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SUCTION DUCT runs the entire length of the leading edge of the right wing.

Porous Skin Cuts Stalling Speed

Boundary layer turbulence at low speeds is reduced by suction through perforated metal wing leading edges.

The aircraft spent hours in a heavily instrumented cabin. It is being pulled off both ends but it stubbornly resists stalling, yielding only by small increments.

While pit, teardrop, and rocket-powered planes are being extended toward their speed-of-sound speeds, researchers are busy ferreting out the aerodynamic secrets for pulling back on the lower end of the speed band.

National Advisory Committee for Aeronautics engineers are bristling over this studies to reduce stalling speeds and improve stability characteristics at these low speeds for safer landings. Results of this research may mean greater safety for fast military planes and future jet airliners.

NACA has experimented extensively with flaps, slots, tabs and other methods of reducing the maximum safe speed of aircraft. One of the agencies has

been in the woodshed with research on boundary layer control by suction.

Test Vehicle-New, Langley Laboratory engineers are representing this study with actual flight tests in a specially fitted aircraft. This is a conventional high wing personal plane modified to incorporate a skin of porous metal along the leading edge of each wing.

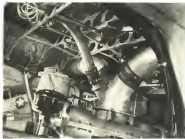
Ducts behind the leading edge are connected to an exhaust system that sucks air through the porous skin. At low speeds, the suction reduces turbulence, inducing a smooth flow of air over the wing to increase lift and delay the stall.

This application is believed to be the first time porous metal has been used for boundary-layer control tests with a flying plane.

Although the experimental work is being done with a small plane, there is



PERFORATIONS of porous metal skin are to free the light on body portions.



BLOWER sucking air from wing ducts in compression stage of B-29 superfortress.

no intention of developing the equipment for personal aircraft.

►Layer Action—In the past, many flap configurations have been developed which increase the lift and thus lower the maximum speed by increasing the effective wing camber. Leading edge slots and slots have been used to decrease the maximum speed by delaying separation of the wing boundary layer—a thin layer close to the surface, slowed by contact with the wing.

At low speeds, the layer thickens and tends to separate from the upper surface of the wing—reducing sharply the amount of lift and causing stall. Thus, if boundary layer separation can be delayed, the plane's maximum speed may be lowered, for greater safety.

Slots or slots delay the separation by diverting some of the high pressure air beneath the leading edge into the low

pressure boundary layer region above the wing, to give more speed to the boundary layer.

Serving the same purpose as slots at stall, the suction method delays separation by sucking air over the boundary layer and blowing the air over the airfoil to increase control effectiveness or changing it recovered through leading edge.

Theoretical and experimental work says NACA's project engineers Paul A. Hunter, has indicated that boundary layer suction distributed over an area of the leading edge via a porous surface might produce equal lift increments more economically than suction slots in the same location.

►Critical Factor Out—Formerly, most boundary layer experiments with suction have employed slots on the upper surface of the wing. Best location of these suction slots is critical, varying



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with each wing design as well as with
different angles of attack of the main
wing. Slot design, too, is a critical factor
— critical, says NACA, that a wing
designer can do more harm than good.

The porous metal skin is seen offering
a great advantage in eliminating these
critical factors. Apparently, it can be
used on any wing shape, and is efficient
at any angle of attack, it is reported.
Thus, the use of porous metal would
eliminate the necessity of running a
series of tunnel tests if section slots
were overdeveloped for various wing
And because the porous metal affords
a relatively smooth skin surface, it is
considered better than slots from the
drag angle. Careless distribution of
the section, instead of concentration at
one location, also aids in preventing
stall, says NACA.

Makeup—Investigating the practical
problems of the installation through
the flight tests, NACA is checking to
determine to what extent the pores are
clogged by rain, dirt blowing around the
airport, sources of insects, etc. Also being
studied are construction details of
the skin and wing, and design factors of
the blower and associated ducting.

The leading edge comprises a 1/2-in.
metal filter cloth rolled and laminated
to reduce porosity. This is backed by a
layer of looser screening and a thin

sheet of perforated brass. Its stiffness
The holes are so small that light can
barely penetrate this porous sheet.

The blower—a turbo-supercharger
compressor passing air at 10 cu. ft./sec.
—is driven at low speed by a 25-hp. en-
gine through a 1:1 gear ratio.

Velocities and pressures are measured
at various duct stations. And the slot
ducts have diaphragms to close off for no
section.

NACA Reports

►A Series of Methods of Determining
Stability Parameters of an Airplane
from Pressure Flight Measurements
(TN 2548)—by Henry Goessberg

This report considers various meth-
ods of reducing to stability parameter
form an aircraft response to measured
and transient disturbances. The simple
and longitudinal motion of an idealized
airplane is used as an example. This
report shows that there are basic limits
in determining some of the stability
parameters, as compared with the
transfer-function coefficients, which are
directly related to the airplane
response. Therefore, most of the re-
port is concerned with determining
transfer-function coefficients, rather
than stability derivatives.

A method of least squares is applied
to give the desired parameters, and also
the ratio of parameter error to that of
the basic data. Determining these
parameters and the corresponding error
ratio is a non-linear problem which
can be solved by iteration, using a
first approximation. Methods for obtaining
a good first approximation,
which also involve a least squares pro-
cedure, are explained and illustrated.
The computer is confined to a simplified
case of longitudinal motion. However,
the presented methods can be generally
applied to other, more complicated
types of motion.

►Effect of Vertical-Tail Area and
Length on the Yaw Stability Char-
acteristics of a Model Having a 45-Deg.
Sweepback Wing (TN 2551)—by Wil-
liam Lefko

Stability information is invaluable
for many of the main components of
airplanes designed to meet the demands
of high-speed flight. Wing design
changes have been extensively studied
to determine their effect on sta-
bility characteristics. But in order to
provide information on the influence
of other parts of the airplane, an investi-
gation of a model with various inter-
changeable components is being con-
ducted in the Langley Stability Tunnel.
(Further reports in this series present the



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methods of investigation to determine the effect of tail area and tail length and the effect of location of a swept horizontal tail. Both these reports were concerned with the static lateral stability characteristics.

A general research model was used, representative of typical aircraft configurations. Three two-blade airfoils of circular cross sections were selected; these had the same maximum thickness, but were of different fineness ratios. Tail plans were chosen to give ratios of tail area to wing area, between 0.075 and 0.225. The model was equipped with a 45-deg. yawback wing with an aspect ratio of 4.

The results of the investigation are reported in the following conclusions:

- Wing-fuselage interference effects were small over most of the angle of attack range.
- At moderate and high angles of attack, the fuselage and the wing produced rather large interference effects on vertical tail effectiveness. But these effects tended to cancel each other and had little overall effect on tail effectiveness.
- Fineness alone had little effect on the effective aspect ratio of the vertical tail.
- Tail configurations in the yawing direction were estimated fairly accurately for most of the angle of attack range by available procedures.
- A full-span wing had very little effect on the tail effectiveness at 0 deg. angle of attack.

Charts and Tables for Use in Calculations of Downwash of Wings of Arbitrary Plan Form (TN 2333)—by Frank B. W. Diederich.

Longitudinal stability analyses and horizontal tail surface design depend on a knowledge of the downwash behind the wing in an aircraft. Available design charts give a convenient means of estimating downwash behind swept wings. These charts cannot be applied to swept wings and to wings of more complicated planform, because the assumed bound vortex is unsteady; the assumed spanwise lift distribution is that of swept wings.

It is not considered practical to present extensive charts to give downwash fields for arbitrary plan forms. This is because of the additional variables introduced by sweep and by complex planform. But when the spanwise lift distribution is known, the approximate line of the wing by a vortex pattern and circulation of the downwash field is associated with that pattern (with certain simplifying assumptions), a fairly straightforward but time consuming problem.

So what this paper does is to present a method, together with summary charts and tables to facilitate such calculations. The tables and charts give

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FIGURE 1: Roto-Lock Fasteners are used in aircraft construction.

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the downwash field of an elemental outflow, laminar vortex flow of the wall is to distribute these vortices along the wing span in such a way that they approximate the lifting action of the wing, and thus superimposing the downwash field of the individual vortices.

The author notes that the method is probably applicable in many cases of potential interest where there are such characteristics as high angle of attack, low aspect ratio, large angle of sweep, high taper, or a relatively large leading edge. These particular features result in an uneven spanwise lift distribution, partly spanwise flow, and rolled up vortices. However, a few comparisons have been made between calculated and experimental results for cases in which the aspect ratio, leading-edge radius and angle of attack are reasonably favorable for such comparisons. Even for these cases, certain discrepancies remain unexplained, but the comparison are rather satisfactory in general.

Several of the charts which would be difficult to read in page text are reproduced in expanded form as an appendix at the back of the report.

► **Water-Loading:** Investigation of a Model Having Heavy Beams Landing and Zero Degree Angle of Dwell Rise (TN 2358)—by A. E. H. McAvoy.

This report covers one phase of an experimental program being conducted at the Langley Aeronautical Lab. Overall purpose of the program is to determine the loading-impact characteristics of hydrodynamic configurations having heavy beam loading.

Time histories of horizontal and vertical displacements, normal velocity, total acceleration, and pitching moment were obtained. The experimentally determined quantities are converted to non-dimensional coefficients; the variation of these coefficients are plotted against flightpath angle at water can flow.

► **Two-Dimensional Transonic Flow Past Airfoils (TN 2356)**—by Yung Hsueh Kuo.

This report is concerned with the problem of constructing solutions for transonic flow over symmetric airfoils. The aspect of the problem which is emphasized is the initial phase, the mapping of the incompressible flow in the case of the symmetric Joukowski airfoil without camberline, mapping is naturally avoided, but the coefficients in the power series are difficult to evaluate. Consequently, the problem requires simplification.

Instead of the exact incompressible flow past the airfoil, an approximate flow is used, this flow differs only slightly from the exact one when the airfoil thickness is small. After this

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approximation of the incompressible-flow function, the numerical calculation of the corresponding compressible flow by the hydrograph theory does not present any essential difficulty.

This work was done at the graduate school of Aeronautical Engineering of Concord University under the sponsorship and with the financial assistance of the National Advisory Committee for Aeronautics.

►On the Problem of Gas Flow Over an Infinite Cascade Using Chaplygin's Approximation (TN-1278)—by G. A. Bagdasarian.

This report is a theoretical, mathematical approach to the problem of a

steady flow of a compressible fluid past two-dimensional infinite cascade. Chaplygin's simplified pressure-density relation is used in the solution of the problem.

The report is a translation of a paper which originally appeared in a Russian technical journal in 1949.

►On the Application of Mathieu Functions in the Theory of Subsonic Compressible Flow Past Oscillating Airfoils (TN 2563)—by Eric Reissner.

This report is a highly mathematical treatment of the problem of two-dimensional subsonic compressible flow past oscillating airfoils. Explicit solutions are found in terms of Mathieu

functions. Results are applied to the calculation of 1-dimensional characteristics for the 2-dimensional theory. The effect of the incorporation of 3-dimensional effects on the Mathieu function solutions of the 2-dimensional problem is shown. The developments are formal and must be supplemented by an appropriate content of numerical details such as before the theory can be applied to specific problems.

►On Two-Dimensional Flow After a Canted Stationary Shock (With Special Reference to the Problem of Detached Shock Waves) (TN 2564)—by S. S. Shen.

The purpose of the present work is an attempt to treat analytically the 2-dimensional problem after the shock. The method assumes a given shock-wave shape, which automatically determines certain initial conditions on the flow variables. Expressions for the stream function in the subsonic region following shock are found by approximate analytic means. After the stream function is obtained, flow density is determined by Bernoulli's equation, which connects density with stream function derivatives. The final solution can then be determined from the velocity field thus obtained.

This work was conducted at MIT under the sponsorship and with the financial assistance of NACA.—DAA



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Naval Aircraft has been on an untripped F-39 Scorpion at speeds over 300 mph to investigate windshield effects on machine of tomorrow.

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ment stress to the loading test loads.
• Loading speed at which rods is active, wearing, presently available equipment, was split barrel.

• Effectiveness of the spread AMO type P-A helmet and face visor in extending the tolerable speed range.

First run at speeds up to 400 mph and under 6,000 ft were conducted with a dummy in the radar operator's station. Only damage was a tearing of the right shoulder on the dummy's vest.

For the second run, Northrop experimental flight department's test chief E. J. Hertz took the radar station (fitted with standard aviator goggles and a Lombard helmet). Plane speed was about 250 mph at various altitudes. As helmet viewed the goggles viewed poor visibility and Hertz had trouble interpreting interphase conversation as a result of helmet noise, Northrop says.

The third flight took Hertz to 6,000 ft, where speed was 375 mph. He wore the type P-A helmet, with two-position visor for eye protection, which eliminated all obstructions to vision.

On the next run, the life-size dummy was in the radar operator's cockpit. The dummy's speed was stepped up to 500 mph. At 540 mph, helmet and oxygen mask were pulled off the dummy, and the left shoulder of the flight suit also came away.

On the final flight, which was made at 520 mph, passenger was Maj. John Shepp, USAF flight surgeon and semi-medical research scientist, active in the development of air crew survival equipment. Wearing a P-A helmet, he suffered no injuries and maintained all faculties during the flight.

Low Nelson, Northrop test pilot, headed the controls on all five flights. Although the plane was within its category, its handling characteristics were not markedly affected, and Nelson didn't encounter any appreciable discomfort.

Cockpit equipment, reports Northrop, was found to be structurally sound to 575 mph.

And the tests, says the company, proved that the radar operator, using an AMO-helmeted visor, could split barrel at speeds over 500 mph.

Boeing Adds to Plant

Boeing Airplane Co. is going ahead with the construction of a \$300,000 10-story building at its Seattle Plant No. 2.

The new facility will figure in the production of the B-52A and B-52B heavy bomber and other programs.

It will be housed in a 200x100-ft. concrete and steel structure and will have two building levels, 18 and 40 ft. The latter are being fitted with two 15-ton overhead cranes.

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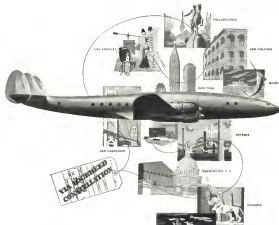
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BEGINS WORK ON GIANT JET BOMBER

Production of an unprecedented number of giant B-47 jet bombers has begun at Lockheed's Marietta, Georgia, factory.

As the world's leading producer of jet aircraft and modern high-speed transports, Lockheed is especially qualified to build the Boeing designed B-47's for the Air Force. Production floor space at Marietta, plus Lockheed's California facilities, makes Lockheed as large today as the entire U.S. aircraft industry in 1940.

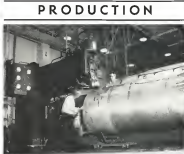
What's going on at Lockheed?

Lockheed has developed a high-speed camera with a speed range of from 2,000 to 3,000 frames a second. At 3,000 per second, a 100-foot roll of film can give through the camera in 1/30 second. Purpose of the speed: to check events when fast-dropping the lift's a black piece of metal. Objectives: development of stronger, new-type alloys for greater, faster aircraft.

Another current research project creates smoke flying conditions 20,000 feet above the California desert. On an actual F-90 All Weather Jet Fighter, a spray bar shoots a fine foggy mist on the nose and wing, building up layers of ice. Plane's de-icing equipment is then tested in actual flight.

Post and future of Lockheed...

One of Lockheed's earlier transports, a Model 10 Constellation, is approaching its 10,000th hour of flying time in continuous service with the U.S. Navy. Lockheed's new B-47's are being built at Marietta, Georgia, and in California. Lockheed's new B-47's are being built at Marietta, Georgia, and in California.



HUGE WELDER with 50-in. throat only handles giant external fuel tank.

New Tools for Speed Welding

Ryan installs giant resistance welding machines for handling large parts; employees develop sequence timer.

A new set of giant tools has been added to the growing stock of aircraft industry shop "heavies." Ryan Aircraft Co. has just bolstered its production line with several new resistance welding machines—reported to be the largest of their kind in the country—to boost its capacity to cope with the growing size of aircraft and engine components.

And to operate these work from its huge battery of operators, Ryan has adapted a more efficient sequence timing panel devised by one employee due to the production picture.

Big Boys—One type of the new huge welders was built by Federal Machine and Welding Co., St. Louis's agent. It will handle such heavy parts as two sheets of 1/2-in. aluminum alloy, 150-in. diameter, concrete pressure vessels, or 25-in. carbon steels. The machine's deep throat stretches 60 in.

The other type was fabricated by Thomson Electric Welding Co. It will take two sheets of aluminum alloy 102 in. thick. Throat depth is 48 in. Each type can be used for spot, mill spot and seam welding by clamping or electrode tips and wheels. Tips are cooled internally by circulating water. Wheel electrodes can be "flush" cooled for welding steel.

High Tech Job—First job for the new

equipment will be to speed production of numerous external aluminum alloy fuel tanks—reported to be the largest known to have been fabricated for aircraft. These resistance-welded containers are preheated first, with gas-tight seams that eliminate the need for sealing compounds.

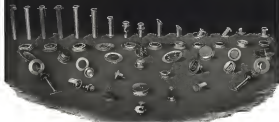
The new machines make the first spoolwork at a reduced heat to avoid damaging the material as a multi-arc heat buildup, after which normal heat is applied automatically.

Weld size is controlled by constant wheels. And the wheel electrode is continuously dressed to do away with the time involved in setting it to a large fire burning. Upper electrodes swing out and away from the work for quick set-up change.

Speedy Control—General Electric electronic controls control 50-cycle, three-phase line power to several lower frequency, single phase requirements. The control panel provides feed-in commands for obtaining measurements of heat, welding operation, or get diaphragm settings on succeeding runs.

Even in using these control facilities to select heat times by full cycle, alternate half-cycle, or plus or minus cycle firing, as required. Alternate half-cycle firing can be used to give exact

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Since the early days of aircraft manufacture we have been a leader in the design, testing and manufacture of filler units, caps and adapters. We've done it for hundreds of existing Army-Navy, aircraft industry and Ordnance jobs—various tanks and shapers for fuel, alcohol, oil, water or what have you. Caps and adapters for dropable tanks and Ordnance equipment, too.

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RYAN's sequencer panel is simple in comparison with machine and (background).

amounts of heat for working aluminum alloys which require higher current but shorter heating times. With the plus or minus cycle being it is possible to get uniformity spreading in which the target is heated off center—an advantage in joining sheets of varying thicknesses.

Power of the new machines is evidenced by the 105,000 amp they will develop on short current across the electrodes. Electrodes' pressure runs to a maximum of 9,100 lb.

◆ New Sequencer. Ryan-Ryan, like other large operators of machine tools, has its production-testing factor of "down" time. It was a huge battery of welding machines of all types. It wasn't unusual for one of its many spot-welding machines to be tied up for as much as 48 hr while the unit's water-winding electronic needed the sequence timing panel—was checked for trouble.

During an eight-hour day, one of these machines can produce more than 30,000 spotwelds, in any appreciable down time later drops into production.

When trouble occurred, checking the intricate circuitry of welded sequencer panels was a tedious job. Ryan's trouble-shooter Eddie Gale and electronics expert Ed Phillips looked at the timer from a maintenance man's viewpoint and came up with a simplified approach. They devised a panel that works so well that Ryan is installing it on all spotwelders for which it is adapted.

◆ Many Ryan-Ryan says that the new machines are easy to service and maintain, some efficient and trouble-free than those available commercially. It is built from a number of readily obtainable parts costing only a fraction

FOR MAXIMUM
JET POWER

Robinson steel engine assemblies for jet aircraft engines. ABOVE: made by Ex-Cell-O. ABOVE: Ex-Cell-O's jet engine assembly. TO RIGHT: and four other Ex-Cell-O jet engine assemblies. All results of Ex-Cell-O's new manufacturing and assembly by Ex-Cell-O in the rapid construction of the aircraft industry.



**Ex-Cell-O
Precision
Parts**



Working in stainless steel to customer's rigid specifications. Ex-Cell-O is actively engaged in production of jet aircraft engine assemblies. This is but one of the latest developments in a long-standing program of service to the aircraft industry. The result engine, propeller, or fuselage of practically every kind produced in this country has parts made by Ex-Cell-O or finished on Ex-Cell-O precision machines. Such wide acceptance speaks well for Ex-Cell-O quality.

Ex-Cell-O has complete parts production facilities, including rough and finish machining, heat treating, and metallurgical control, all done directly under one responsible management. All these facilities are being utilized by the aircraft industry in its rapid progress in commercial and military air power.

Below: Ex-Cell-O's typical precision aircraft parts division. Located by Ex-Cell-O in customer's specifications.



EX-CELL-O CORPORATION Detroit 32, Michigan



Feeling low about the steel situation?

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Made to conform to
United States Air Force
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Simple 2-piece construction
- receptacle, stud and pin

MONADNOCK
MILLS
San Francisco
California

Monadnock, with a wealth of foreign experience, also welcomes inquiries from manufacturers seeking reliable development and production facilities.

of the pace of parts that can be produced. And loss of valuable spotwelding machine time resulting from sequence panel trouble has been cut to a minimum by use of the equipment, the company reports.

The unit also regulates, auto-changeable either when it is needed to 11.5 in. tube-type sections. Although small, these solenoids actually have larger contacts than those used on standard solenoids. This permits them to carry a heavier flow of current and extend service life.

The timer can be used on any resistance spotwelder of the single phase or three-phase type by simply installing or removing a jumper wire. This allows substitution of a common panel for spot resistance.

It isn't difficult for manufacturers to learn that one panel's details and the elements of the need for functionality with the different types of installation for the various machines.

✓ True Speed, Exact Out—Just a machine doesn't have to be taken out of production for more than a few minutes if the new panel isn't functioning properly. Manufacturers remove the defective timer and install a spare-ready one, because the unit is lined with plug-in connection. This done, the faulty timer can be worked over in the maintenance shop, without cutting into machine time.

Another dividend is the elimination of expensive spotwelding resulting from operator error. Ryan says that with standard panels it is possible for the operator to release the foot switch before the welding current has been cut and bring the fusing process to bear during part of the weld time. This excess pressure prevents the formation of the spatters.

With the new panel, the operator can't do that because the circuit can't be arranged that he can't stop the automatic automatic balance of the sequence timing after the cycle has started. Each solenoid locks itself in and cannot be opened prematurely because of sequence error.

Master Planner To Expedite Production

Consist of using a master planning system to analyze factory data at Fort Worth to keep management informed of the work load and the plant's capacity to meet it.

It is believed that this system will obviate the necessity for forming special committees whenever there is contemplated change in production schedules. Managers at the new section is V. C. Gilson, formerly production manager.

What's the right oil for your airplane engine?



You've heard so much about aircraft oils you probably want to know which one is best for your own engine. Good idea. You'll fly more safely, no matter what type of engine your plane has, if you use the right oil for your engine type. For example:

Horizontally opposed engines need Gulfgrade Aviation Oil Series-D!



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LA 9:45 a.m. DT NY 10:45 p.m. DT
LA 9:50 a.m. DT NY 11:15 p.m. DT

AMERICAN AIRLINES INC.

AMERICA'S LEADING AIRLINE

EXPANDING INDUSTRY

Aerol Co., Inc., Lockheed Aircraft subsidiary, has moved to larger quarters (18,000 sq. ft.) at 2414 San Fernando Rd., Los Angeles.

Airwest Industries Laboratory, Merced, N. Y., has broken ground for a new engineering and production design building, adding 50,000 sq. ft. to the firm's facilities at a cost of about half-million dollars.

Aircraft Engineering & Maintenance Co., Oakland, Calif., has secured a \$5-million USAF contract for overhaul and maintenance of C-54s, and has improved its overhaul facilities from 125,000 sq. ft. to more than 355,000 sq. ft.

Airvision Engineering Corp. has moved its executive, general and engineering offices into a new building adjacent to the plant so as to provide more production space. Firm is located in Woodside, L. I., N. Y.

Barrick & Leeds Optical Co., Rochester, N. Y., has formed a special defense contract department to handle its increase in military orders and is seeking about 500 more workers.

Borg-Warner Corp., Chicago, plans a 104,000 sq. ft., \$7-million plant in Wooster, Ohio, for output of jet engine electrically driven hydraulic and fuel pumps.

Broward County Airport, Fort Lauderdale, Fla., is taking defense expansion money of Aerostar Service Corporation, Inc., L. I., N. Y. has leased 15,000 sq. ft. of plant space to produce subsonic electronic equipment. Consolidated Production, Inc., formerly of Detroit, is turning out electronic equipment in a 16,820 sq. ft. building at the field and Lauderdale. Tohose, Products, a division of Detroit Branch Co., is making jet engine components.

Glenns Metal Heat Corp., Maywood, Ill., plans construction of a 120,000-sq. ft. factory for fabricating aircraft components and assemblies.

Gleason Corp. has broken ground on 2.6 million sq. ft. production and test facility where P-40 tailboots will be built for the Navy, with operation scheduled for early 1953. Also, a new Chrysler plant in Indianapolis is being completed to turn out parts for the J-45 and executive parts for civilian needs.

Golden Radio Co., Cedar Rapids, Iowa, has established a permanent

division to coordinate activities of the manufacturing division's purchasing department.

Globe Refrigerator Co., Greenville, Mich., has received a subcontract from Chance Vought Aircraft to build wing fins for Cosmos fighters.

Grand Central Aircraft Corp. is expanding facilities at Tuscon Municipal Airport following granting of a 56-mile long Federal Reserve Bank loan. The firm is busy dismantling Boeing B-29s.

Grodyne Co. of America is consolidating all engineering, manufacturing and administrative activities at a newly secured plant at Flowerfield E. 1, N. Y. The plant has 30,000 sq. ft. of manufacturing space and a railroad siding.

Hudson Motor Co. Co., Detroit, has completed subcontracting arrangements with Chrysler, Chrysler Engineering, and built B-57 Canberra rear fuselage and tail sections.

Institute Engineering Corp., El Segundo, Calif., has received a contract for new 51 million Doss Douglas Aircraft to make AD-4 Skyhawk fuselage subassemblies. Institute will hire 125 new employees to handle the increased business.

Lockheed Aircraft Service, Inc., has built a 6,000-sq. ft. warehouse at its Burbank, maintenance and overhaul base.

Lovington Engineering Co., Los Angeles, has doubled its production capacity for machining precision components for aircraft by moving to 8717 Melrose Ave.

J. A. Mauer, Inc., Long Island City, N. Y., has received a contract for approximately a half-million dollars from USAF for 16-man Type G-12 engines for recording radar signals.

North American Aviation has started construction of approximately 134,000 sq. ft. of covered floor space at Fresno Air Terminal it has leased from the city for manufacturing operations.

Pacific Aircraft Corp., Burbank, has gotten a \$9.5-million USAF contract to overhaul an undisclosed number of four-engine transport planes, at costing the firm's backlog to over \$11 million.

Prott & Whitney Aircraft has leased 70,000 sq. ft. of floor space in the Minneapolis's Foundry Co. building



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Listing 82 is A General Catalog of Amphibian Components—with the same open-ended list of a request or company or government agency followed.



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ATLANTA: 1000 Peachtree Street, N.E., Atlanta, Ga. 30309

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 100% natural oil. LTL vol. \$50,000.
 Sordani-Berg Inc., Parkway N. 4
 experimental tests. \$50,000.

Norman & Naomi, Married High School

1997-98 Sales Tax Exemption for Energy-Related Operations for Education and Public Utilities

Support Research Institute, Stanford
CSE study of production facilities and
F&E procedures 128 911

David Products Engineering Co., David
Bolt Co. Inc. for production of 4000
announcements 1774-444.
Needlepoint Machine Tool Co., Rochester

Taylor, Forge & Pier Metals, Chicago
-supplier for production of a heavy forgings

Thompson Products Inc., Cleveland, Ohio, is seeking for buyers of engine components, new \$110,000 purchase for engine com-

Q. & Sonage Mfg. American Machine & Sprinkler Co., Hollywood, Pa. says, und.

add printer CI 610, 1.871 m. 119 021;
insurance FL 912, 111 001; gas,
brake oil, air, CI 547, 8,506 m.
109 447. Duesenberg CI 600 and

Yusef Mfg. Co., Portland, Ore., manufactures
of 250, 320 and 375, 440

Wagner, Patricia G., New York facilities for protection of radio signals over 400 mhz

Waukegan, Illinois, U.S.A.
 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633

Wright Aeronautical, Chrysler-Wright Corp., Woodbridge, N. J. Paid \$500 for pro-

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During Alkmaar Co., Seattle, services and engineers it installed drainage, gas and

Information in Division 5 is obtained from
911-0001, 911-0002 and 911-0003 and
911-0004.
Champion Forge Co., Cleveland, Ohio

per production of aircraft forgings, 1977
\$119 000

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There's scrap shortage all around. Your scrap—every pound of iron and steel scrap you can locate in your plant or factory—is a vitally needed and needed right away. For unless you do everything possible to get that scrap on its way to the mills, steel production is bound to slow up. That can't be allowed to happen. But without your help it surely will.

It takes at least one-half ton of scrap to make one ton of steel. With the mills turning out more than 2 million tons of steel per week, over 1400 carloads of industrial scrap are needed every day. And industry, meanwhile, must provide it.

What you can do to control this emergency

First, organize a permanent Scrap Salvage Committee and make the "drive-by-scrap" part of your daily operations. Search out every possible source of scrap. Turn your old and worn-out equipment, tools and machinery over to your scrap dealer, if one. Dig out your scrap dealer's name, address and location, your old car and truck and other household junk, and start them back to the dealer through your scrap dealer. Enlist every employee to report any old or obsolete machine that now stands idle—use that it is time to be scrapped.

By getting this "dominant" scoop off your premises and into the furnace you'll be helping not only yourself but America as well. More sweep turned in, means more steel turned out—it's as simple as that. So let's not waste.

To the mills, James -

This page would ordinarily be used to tell you about
SHELBY SEAMLESS AIRCRAFT TUBING

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

San Jose, Calif. (UPI) — The San Jose Sharks have signed forward Matt Murray to a one-year contract, the team announced Tuesday.



2. 2000

UNITED STATES STEEL



Just as prompt through "flying boom" into Mustang from McDonnell's control plane at both altitudes.

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"Intercomms" is less than a year ago—routine today.

That's the story of how Boeing, working closely with the U. S. Air Force, has perfected a reliable radioing technique capable of serving bombers and fighters—greatly extending their range and effectiveness.

Already, mid-air refueling equipment is standard on the B-50 Superfortress and the 600-engine bomb B-47

Stratofortress. Successful tests have also been made with Uncle Sam's high speed jet fighters.

Two Boeing developments make possible fast, safe, mid-air refueling. One is the ingenious "flying boom"—a telescoping pipe from the tanker plane through which fuel is pumped into the receiver ship.

The second development is the KC-97A Stratofreighter tanker which

can rendezvous at high altitudes with the B-47 Stratojet—or jet fighters—and make large quantities of fuel very quickly.

Advances like these explain why Boeing airplanes continue to grow, not only in speed and striking power but also in range, long after they leave the production line. They help keep America out in front in the world parade of airplanes.

BOEING

For the Air Force, Boeing built the B-47 Stratojet, B-50 Superfortress and B-47 Stratofreighter; and for the world's leading airlines Boeing has built fleets of the new long-haul Stratocruiser.

EQUIPMENT

C&S Maintenance Plan

Specialist for Each Plane Type

Making one man responsible for Combes and one for DC-3 details has paid off in faster, smoother maintenance.

By George L. Christian

Memphis-Southwest relationship between flight crew and maintenance mechanics is being fostered by Chicago and Southern Air Lines. To attain this goal, the company has appointed one man to be responsible for every detail of maintenance of one type of aircraft. Most airlines know only too well that the pilot's cry "I've squawked that storm on three consecutive flights and nobody does anything about it."

To wipe such comments off the pilot's lips, C&S chose two men, one thoroughly familiar with the Constellation, the other with DC-3, made them technical foremen and gave them the job of following every malfunction, that occurred on the respective planes.

R. Herring, chief for Comets, was thoroughly indoctrinated at Lockheed, Wright, and Hamilton Standard before assuming his duties. If Herring, DC-3 technical foreman, not already well versed in the older ship.

By now it would be advised

by teletype of any mechanical failure that occurs to a plane under his jurisdiction the moment it happens at any base station except for those in the Caribbean area where teletype communication with the Memphis headquarters is being established.

As soon as possible, Herring or Herring's chief, the proper corrective action is taken. The know how of what to do is not only passed on to its immediate knowledge of the aircraft and all its components and systems, but also on possible previous experience with similar troubles. Sometimes it happens that the technical foreman had recognized symptoms of equipment malfunctions developing in the aircraft progressed from obvious to critical, thus enabling him to anticipate a failure or at least prevent a mishap in its track.

By working together closely, the trouble-shooters are often able to predict flight crew needs before they are requested, since certain problems are common to any aircraft.

Case in point, according to Tom



MORE COMFORT FOR PAA CREWS

Crew bunks on Pan American World Airways Boeing Stratocruisers tend to be in the forward cargo compartment. This led to two disadvantages: space available for cargo was curtailed and crew crew members slept to being shut up in a dark and windowless hole. So PAA engineers installed these comfortable bunks on the flight deck.

Just behind the pilot's seat and across the aisle from the flight engineer. To make room for this double bunk, the cabin operator's place was done away with completely. Since PAA's new main cabin telephone (Vision Work Dec. 31, 1950, p. 57) and the aircraft's radio and equipment was moved to the right side of the flight deck.



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Yes, you'll be proud to say, "I'm a Boeing engineer!"

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JOHN G. SANDERS, 2nd Deputy General Manager, Boeing Airplane Company, Seattle 40, Wash.

Enclosing appropriate resume of Boeing interest, the resume and the letterhead information.

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THE TRADEMARK OF DEPENDABILITY

Leslie, C&S director of engineering and maintenance, was a recent negotiator by a Cessna engine for a new and better type of fuel system for the pilot's seat. Blowing get it for him and told him that who passed it for the DC-3 crew before they had gotten wind of it. They were actually pleased by such a forward thinking act.

That the technical foreman team has gained flight crew confidence is underlined by the fact that captains will call one of them from a station to ask for advice on a malfunction.

Still another benefit derived from this method is when malfunctions cannot be corrected at the station, the tech crew knows the make of the aircraft work sheet prior to the plane's arrival. This reduces time on-site to a minimum and prevents the extra work load to be efficiently scheduled with routine maintenance checks. The team are constantly upgrading machines with to make sure that it is performed as meticulously as possible.

Leslie said that this bridging the gap between flight crew and maintenance is paying off in morale as well as dollars and cents—the pilots now are assured that their aircraft are brood.

► **Marketing.** Transmitter — W. W. Roodman, C & S's director of maintenance has a definite formula for keeping his aviation maintenance equipment in top-top shape. Do as little as possible to your transmitter and receiver, he advises—“bricks” is left in their equipment.

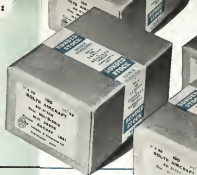
At C & S, there are all of every kind of aircraft maintenance are due to take before, he told Aviation Week. Bearing out this theory, he has experience with the Boeing RTA-13B transmitter. The set has the more scheduled in recent years with a 1,000-hour overhaul period as well as 1,200 hr.

Although not original with C&S, grounded high frequency aerials have proven themselves as giving excellent results, according to Roodman. The HT set, a 100W Collins 188-A, is consistently good for a range of over 3,000 miles. By grounding the antenna where they attach to the web-based line (in a coil), the detrimental characteristics of the antenna are changed at certain frequencies, the related range being increased some 25 to 40%.

How successful grounded antennas are is indicated by the fact that C&S frequently worked planes in California direct from Memphis. Moreover, since last December, the company has not failed once to work, directly, aircraft on the ground at Memphis Airport, Tennessee. Roodman said that the set's comparison piece, the Collins 51 N set, is giving superior performance. ► **Cockpit speaker.** C&S has just received FAA approval to install cars

aircraft manufacturers.

Here's what SOURCE INSPECTED BONDED STOCK means to you



The "Old" Way:

1 Fasteners shipped in bulk so you through your distributor without source inspection. This requires considerable paper work with certificates of chemicals and physicals. You must keep such paper in your files so you can dispose of the material if it becomes "Excess" or "Surplus".

2 Bulk storage complicates inventory control, makes possible mixing different types of fasteners and makes inventory of the assembly line costly and time consuming.

3 Fasteners in bulk, when declared surplus, have, in the past, been found to have little more than scrap value.

The Lamson SOURCE INSPECTED-BONDED STOCK way

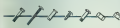
1 All fasteners sample inspected in accordance with approved sampling charts, inspection stamped at the source. Individual cartons packed in easy-to-handle packing cartons. No certification required—the sealed cartons with inspection stamp is all that is needed.

2 Packages plainly labeled with contents... size, part number, specification, when manufactured and by whom. Storage and inventory control is greatly simplified. Withdrawal from stock or stores is quick and easy—no counting out—just so many unit packages or cartons.

3 Source Inspected Bonded Fasteners are "like money in the bank". If declared surplus they can be disposed of at market prices without "red-tape".

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AVIATION WEEK's total for the 9 month period (1951) was 1841.94 pages, **Aviation Age** 550.93, **Aero Digest** 532.74 and **American Aviation** 508.37. This represents an **AVIATION WEEK** gain of 592 pages over the similar period of 1950... an increase that is alone more than the total advertising pages carried by any other aeronautical publication for the same 9 month period.

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head speaker amplifier units in the cockpit, one for each pilot. The units will give the crew greater comfort by eliminating wind howl, and the battery will still be carried in case of speaker-amplifier failure. Each battery will in no way affect operation of head phones.

The set being built in the aircraft will be a completely self-contained, automatic 15 x 7 x 24 in. and weighs 2 lb.

It has a 24-w. undulator power unit and outputs a 5-w. frozen speaker with a range of 150 to 6,000 cps.

• **Stentair-Two-Liter-G D. Bragg.** C&S engineer has found a way of drastically cutting the replacement costs. He has reduced the cost of a DC-3 landing to 24 cents. Comparable cheap landings will soon be forthcoming in the Company, he predicts.

Then behind Bragg's scheme is that aircraft tires may be recycled at cut times before being pulled, not just once at time at most airports. He says a tire in long service and subjected to an aircraft tire are very small in comparison to an automobile tire. Therefore, the strain imposed on the sidewalls of an aircraft tire, especially with more and more used in relatively slight C&S use the Hankinson method, which means only the crown of the tire, the most subject to wear.

By recycling only the crown, instead of both to be used in other portions, the sidewalls of the tire are not adversely affected by heat during the recycling process. This also naturally is keeping the sidewalls fresh and helps in prolonging their life.

Bragg's said that C&S has gotten as many as seven cents on DC-3 tires. It is interesting that there is no pattern of correlation between failure of one tire versus another. Actually, the entire tire, it has been found, can be a disk or such group tire. Now has the airline established a maximum number of times a tire may be recycled. When sufficient work, the tire is sent to the Stentair-Two-Liter-G in Memphis. The tire is either recycled or rejected. In the latter instance, C&S is advised of the cause for rejection, so that it may keep strict control over reasons for tire failure.

Meanwhile, Cosmic tire retreads to date are three, but not enough time has been put on the plan to determine how long the number may go.

• **The Statistics—Here are some statistics:**

- Average tire tread life on DC-3-765 landings.
- Average cost per landing, including purchase of new tire and cost of repair—24 cents.
- Average tire tread life on Continental—300 landings on main drive tires, 140 on shallow tread nose main tires.
- Average cost per landing—\$2.46.



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AND OPERATING EFFICIENCY

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navigation, loads to carry—loads to fly. This is only one of the many distinctions of the J40 which place it as the forefront of today's jet propulsion field.

Look for further developments about the J40...it will spark a whole new group of speedier, high-performance military aircraft. Look to Westinghouse research and engineering for constant progress in jet aircraft power.

J40-111



NEW AVIATION PRODUCTS



Plane Air Valve

A diversified line of valves, for use on high pressure pneumatic systems in aircraft, has been placed on the aviation component catalog by Add.

Included in the line are three- and four-way solenoid-operated units, three and relief valves and check valves. They are designed to operate with maximum efficiency under all service conditions with maximum longevity. The valve shown is a four-way solenoid-operated type. It's built to meet instantly at pressure up to 3,000 psi.

Add division of General Metals Corp., 10775 Van Dine St., Redford, Mich.



Pressure Fuel Cap

A filler cap for pressurized fuel tanks in aircraft, that can be opened by hand and apparently is one of the lightest in weight thus an innovation, is being produced by Gabb Special Products.

The new cap, dubbed "Safe-T-Lock," is designed to meet requirements of high-speed, high-altitude planes. It already has been service tested and now is being installed in those of the latest type jet fighters, the company reports. The unit is built to seal at pressure up to 160 psi. It will open safely under pressure (think that's not a typo) and, naturally, the company says. It can be

incorporated readily into present aircraft designs, according to Gabb, and is furnished as a self-contained unit with no detachable parts.

Gabb Special Products division, E. Hansen & Son Co., Windsor Locks, Conn.

Torque Tests Speeded

All the various types of hand torque tools (anything from a two 1 in. lb. torque screwdriver to 7,500 ft. lb. torque wrenches) on the maintenance line at the shop now can be tested and set accurately by a single, time-saving device recently developed to meet Air Force needs.

That's the claim of Redwood, Inc., for its new "Levermost Analyzer," built to USAF Specification MIL-T-4183A. This portable equipment is accurate enough for laboratory work and rugged enough for daily shop work. With it, tools can be tested, set and rejected in about one-fourth the time previously required with other tests and calibrations, the firm says. It is simply operated and personnel can learn quickly how to use it to check out hand torque tools.

The Levermost Analyzer is entirely mechanical and is operated manually, so no external power source is required. Four separate stations on the unit check torque settings from 1,000 to 10, 100, 1,000 to 10, 1,000 to 10, 10,000 to 10, 100,000 to 10, 1,000,000 to 10, 10,000,000 to 10. Adaptation for each station and "key" or all recognized torque wrenches. Adaptation also can be supplied for torque wrenches mounted against cables, rope or wire. The tester weighs 200 lb. and with a set of adapters is priced at \$1,600 FOB Los Angeles.

Redwood, Inc., 808 Santa Anita Ave., San Gabriel, Calif.

Tiny Rectifiers

New ultra-thin silicon rectifiers (including standard unidirectional and speed suppressor types) are being produced as a variety of configurations for military and commercial applications by the Precision Rectifier division of Electronic Devices, Inc.

Stocked under the line name, "Minis," the rectifiers can be supplied hermetically sealed and vacuum-proofed. They are available with ratings up to 2500 mW output and 25,000V a.c. input per single stud. The units are constructed of matched thin film silicon rectifier only encased in Bakelite, glass or metal housings. Strict quality control is maintained in producing these rectifiers, says the firm, with resultant dependability permitting them

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Holes

IN OUR

Head



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WITH RAIL EXPRESS RATES.

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Point to Point	\$10.50	\$14.40	\$14.40
Point to Point	\$10.50	\$14.40	\$14.40

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ENGINEER'S NOTEBOOK



V-Bond Coupling Speeds Overhaul

A stretched Marmar V-Bond Coupling saves an hour in overhaul time on Pacific Aerospace's Model 133 Cabin Pressure Regulator. Replacing a conventional bolted joint, this coupling speeds assembly and disassembly with its patented quick coupler lugs and provides a light weight part and that has passed 61 of A.A.P. vibration requirements.

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Precision Machining Division, Elco
Instrument Inc., 439 12 St., Brad-
ley 11



Fittings Cut Weight

Connections for aircraft systems, designed to cut weight of fitting installations up to 50% when used to secure tubing to tanks, pumps and other accessories, are being marketed by Flight Refueling, Inc.

The pipe connectors are designed to replace AN fittings for large diameter tubes. They provide a fast-tight joint, and cut assembly time to a minimum, the company says. The connectors can be used to pressure fueling systems, for oil, hydraulic and hot air lines. They are available for tubes from 1 to 44 in. o.d.

Flight Refueling, Inc., Danbury, Conn.

ALSO ON THE MARKET

Hard work is taken out of pulley jobs by converting Grip-D Matic pulleys to hydraulic power with "Power-Twin" unit. Quick-detach unit also can be used with push pulley and on bench or portable presses. Chasman Tool Co., 504 Cedar St., Shelton, Mass.

Quick-Block speed working, give protection during spray painting, handling, etc. Available in standard shapes or as specified, these "Switch Block" pressure-sensitive units come pre-cut, can be used to cover windows, doors, etc. W. H. Brady Co., 1602 E. Sprang St., Chuggers Falls, Wis.

Thermocouple point is available upon in reasonable quantities. Point undergoes color change at predetermined temperatures, is useful in studying heat-treating processes, heat-treating qualities of materials, protecting equipment from overheating, etc. Tempco Corp., 132 W. 22 St., New York 11.

"Radialoid 2" hot immersion compound is used to turn steel and steel tubing or leaving sections into corrosion resistant, highly absorbent, non-metallic areas, increasing capacity of these surfaces to retain lubricating oils for longer periods. Oetgen Process, Inc., 15 Bank St., Staten Island 1, N. Y.



Higher...faster!
new theory jet interceptor will stop them! It's the Douglas XF4D Skyray. Now flying the XF4D is a big wing airplane of advanced design. The Skyray is designed for catapult take-off from carriers to intercept on enemy before he can attack on or land or sea. The Skyray was designed and built by Douglas at the El Segundo Division. It is another propulsion that reflect the pioneering of Douglas engineers in the many fields of aeronautical science. Douglas Aircraft Company, Inc.

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CAB Severs Domestic Mail Pay-Subsidy

• Action gives a reliable picture for first time of government support.

• And Board expects this portion of our air mail bill to drop sharply.

Squaring existing congressional efforts for air "mailers" with the new regulatory scheme, the CAB has announced its decision regarding air mail subsidies from the Civil Aeronautics Board last week. The decision compensates rates for all domestic carriers.

For over and above each compensatory rate will be fully labeled "subsidy" for the first time through Congress, Post Office Department, and other interested parties a reliable picture of government support as to transportation in itself also give industry powerful propaganda ammunition for their drive against "forced" government loss must bring down to their relief some parties.

• **"Alone Man"**—Only a few months ago, CAR's Chairman Donald Nyrop testified before Senate's Interstate and Foreign Commerce Committee that it would be impossible for the Board to arrive at compensatory mail rates for domestic carriers by June 30, 1957. Rates would be separately established for each carrier and only after "orthodox procedure," involving lengthy hearings, he said. This brought the rate determination from the committee's chairman, Sen. Edward Johnson. "It's always manner with CAB. The Board would arrive upon the subsidy closest to the subsidy, if left to its own devices."

Also, according to Board policy changed, Nyrop announced a 45-cent-on-mile compensatory rate for the Reg. Five-Airlines, Eastern Air, United Air Lines, Trans World Airlines, and United Air Lines—had stated that rates for the regulated domestic carriers would be fixed by Sept. 30.

To fulfill this promise, the Board abandoned its "orthodox procedure" approach, and divided carriers into seven groups, according to the nature of their operations. The compensatory rate, ranging from 45-cent-on-mile rate of the longhaul heavy-weight Reg. Five to \$7.26-a-ton-mile rate for short-haul low-traff. local lines, was geared to the operational cost and in-

Compensatory Mail Rates

Following are the "compensatory" mail rates for domestic air carriers established by Civil Aeronautics Board for the 1957 fiscal year, the current 1957 fiscal year, and the retroactive rates for the 1956 fiscal year. The compensatory rate will not necessarily be the total rate the Board will certify for payment by the Post Office Department. But additional pay, over and above the compensatory rate, will be labeled "subsidy."

Group I: Compensatory Rate Per Mail Ton Mile \$0.45

1956	1957	1958
American Eastern TWA United	American Eastern TWA United Northwest	American Eastern TWA United Northwest

Group II: Compensatory Rate Per Mail Ton Mile \$0.53

1956	1957	1958
Boeing Capital Chicago & Southern Delta Northwest Western	Boeing Capital Chicago & Southern Delta Northwest Western	Boeing Capital Chicago & Southern Delta Northwest Western

Group III: Compensatory Rate Per Mail Ton Mile \$0.75

1956	1957	1958
Colonial Continental Inland Mid-Continent Northwest Pioneer Pittsburgh	Colonial Continental Inland Mid-Continent Northwest Pioneer Pittsburgh	Colonial Continental Inland Mid-Continent Northwest Pioneer Pittsburgh

Group IV: Compensatory Rate Per Mail Ton Mile \$0.91

1956	1957	1958
Piedmont Pioneer Reuben Southwest	Piedmont Reuben Southwest	Reuben Southwest

Group V: Compensatory Rate Per Mail Ton Mile \$1.48

1956	1957	1958
All American Braniff Empire Frontier Trans-Texas West Coast Western Central	All American Braniff Empire Frontier Trans-Texas West Coast Western Central Lake Central Oriskany Southern	All American Braniff Empire Frontier Trans-Texas West Coast Western Central Lake Central Oriskany Southern

Group VI: Compensatory Rate Per Mail Ton Mile \$2.58

1956	1957	1958
Lake Central Oriskany Southern	Lake Central Oriskany Southern	Lake Central Oriskany Southern

Group VII: Compensatory Rate Per Mail Ton Mile \$7.26

1956	1957	1958
Central MacWest Wiggins	MidWest Wiggins	MidWest Wiggins

cludes, in addition, allowance for an 8% return to the carrier.

The compensatory rate also reflects "cost of service," based on various ton miles per station served. This criterion, the Board stated, gives weight to these factors: length of traffic haul and average distance between stops, density of traffic volume of operations.

• **Without Consideration**—The rates were established, the Board admitted, without consideration of the individual operating factors of carriers, and without consideration with the carrier. But the Board promised that "adequate opportunity will be provided to submit the viewpoint of all parties" to submit progressively the separate formula in the future.

The Board's new action is consistent with the Senate-passed Johnson bill directing operation. That measure establishes five categories of compensatory rates, ranging from 45 cents to \$1.58 a ton mile, but only until and when the Board sets different rates.

The Johnson bill authorizes subsidy growth to remain in the "cost of service" and "national defense" interests. The growth, under the measure, would be made from appropriations in CAB. Post Office Department would only be required to pay the compensatory rate for transporting mail.

Until such legislation is enacted, Post Office will continue to pay the mail rate certified by CAB, which will include the subsidy portion as well as the compensatory portion.

The Board extended its intention of fixing compensatory rates for international carriers by June 30, 1957.

• **Schedule Outlook**—The Board gave the following outlook for future subsidies, under the compensatory rates which have been established for the domestic carrier:

- Out of the total domestic mail pay of \$61.9 million in 1951 fiscal year, \$37.4 million was compensatory pay and \$24.5 was subsidy.
- Out of the anticipated 557 million total mail pay for the current 1952 fiscal year, \$29.6 million will be compensatory and \$27.7 million will be subsidy payment.
- By the 1955 fiscal year, the total mail pay will go down to \$55.8 million—\$33.8 million compensatory and \$22.0 million subsidy payment. This would reflect a \$0.198 reduction in subsidy from the '51 fiscal year.

The Board also pointed out that over the 13-year period since enactment of the 1938 Civil Aeronautics Act, Post Office has had only an average \$4.1 million a year in air mail and service. Present to compare with the cost of air mail the sub-mail service, totaled \$775 million over the period, revenue from air mail postage added up to \$718 million.



D. F. Maguire

D. R. Petty

I. A. Herber

Top Positions Change at United

A reshuffle of United Air Lines' executive staff has resulted in a series of not only employee morale as well as a reshuffling of top operations and maintenance management.

To increase efficiency and to provide closer division of major departments of the company's operations, President William A. Peltzman announced these changes:

- J. A. Herber—From vice president operations to vice president engineering and maintenance.
- D. R. Petty—From flight supervisor to vice president flight operations.
- D. F. Maguire—From vice president passenger service to vice president transportation services.

potions services, taking over responsibilities for all ground service operations as well as all flight passenger service.

Reporting to Maguire will be D. F. Lerner, in assistant vice president transportation services. O. C. Egan, in general manager of passenger service, and S. V. Hall, in general manager of ground services. All three are UAL veterans.

The fact that Herber and Petty, long-time UAL pilots, may be a significant aspect of the reorganization when viewed in the light of pilot discontent with restricted contract agreements and the possibility that the personnel factor may have contributed to the crash of the recent crash.

BEA Head Sets Copter Time-Table

What is the maximum-size helicopter needed to operate profitable helicopter passenger service?

Nothing smaller than a 40-passenger type, says Peter Massfield, chief executive of British European Airways. "When we can operate large passenger helicopters from city center to city center for distances up to about 200 and between times, then I am sure we shall have a viable means of transport which will accept the pool," BEA's head says. He used this situation as reason in 1948.

Here's how Massfield projects the development of a satisfactory rotary-wing type for BEA service:

- 1955—Experimental operations with one Bristol 171 carrying 12-14 passengers.
- 1956—Preliminary scheduled service with 171s.
- 1957—Introduction of a developed and enlarged version of the 171.
- 1960—Preliminary services with a large commercial type.
- 1965—The large copter established as a permanent commercial carrier.

CAB Delays Change In Cockpit Rules

Civil Aeronautics Board has delayed the effective date of its cockpit standardization requirement for new planes. So none of the commercial transports now on order will be required to meet the cockpit standardization requirement.

The regulations would have applied to Commuter Lines' 340s and Super Constellations, the two latest transport designs being developed. But United and other airlines asked for waiver for their planes on order.

Meanwhile, some of the experts started coming up with desirable changes in the layout proposed by the regulators.

Main reason for the delay is that Society of Automotive Engineers' cockpit standardization committee, including many leading pilot and aeronautical engineers, will make a detailed study of the problem soon.

CAB has postponed consideration of raising the cockpit standardization regulations—Amendment 4B-2 to Part 4B of the Civil Air Regulations—by April 1 of next year.

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Memos From Aviation Week's Staff

Dear Bob & Mike:

Los Angeles

Here's some incidental intelligence from my four-day cruise on the aircraft carrier Valley Forge.

The F4F seems to be a rugged fighter, with good landing characteristics. It's now well adapted to carrier routine. Chief pilot gripe is the "stink stator." Seems it doesn't work properly and is liable to indicate a stall at about any speed. So sometimes pilots land a little low, the jets are not catapulted every 20 seconds or so. While warming up, jets are stacked around the flight deck with their tails pointing over the side.

Very officers admitted the jet was treated like a prize damn at first. Then they discovered they could handle it as well as a Corsair or AP, also learned how to hang more weight on it. Jet has a long way to go before it can take off with the Thunderbolt's load of some 6,000 lb. of bombs etc.

Most critical factor in carrier landings is judging speed of approaching jets, landing signal officer can't tell by the stick as he can with a prop job. Jet looks like some at 90mph so it does at 120. So the margin between too fast and too slow a landing is darned tight—about 10 knots. It's better to land a little fast than too slow and stall and go into the drink. But the jets can't land too fast either or they'll become ever bolder and heavier into places on the deck up forward. This landing speed is so critical a skipper of a carrier will time off two extra battles just to get an extra load of used aircraft deck during jet landings.

EXTRA Reason of the critical landing factor the Navy and Republic are working like hammers to perfect a new FM radar landing speed indicator that works on a new principle and will give the str officer and the landing signal officer an accurate landing speed of the jets (also closing rate) and tells whether to wave the jet off or set it down.

Fillets Glisk the FM Republic and North American's Fury both will be "comfortably in the 700 mile class," but so much enthusiasm for the Douglas F4D Sky Knight. They say it hasn't yet been able to prove the weight-carrying claims made for it in some quarters, but these lots of excitement on the 120 horsepower Skybolt.

Incidentally, some technicians say all carrier landings are handled by CGA in about five years.

Incidentally, I found very more enthusiastically particularly about diversifying naval air and its place in the sea with the air force than is true the other way around. Most aviators people look for a period of fruitful activity for naval aviation and carriers for 20 years. They don't seem to look much beyond that. They believe there is great uncertainty of naval and Marine aviation alone support. They observed that some flyers had worked at close support harder than the air force has, so were successful in Korea.

Tom Self

WHAT'S NEW

New Books

The Aircraft Industry, A Study in Industrial Location, by Dr. William Glavin, Commissioner, University of California, Los Angeles, with a foreword by Rex Carl Hinchey. Published by Laven L. Morrison, 1915 South Western Ave., Los Angeles 35, 248 pages, 14 maps, 17 statistical tables, price \$6.00.

This comprehensive study covers the manufacturing phases of the industry from its birth up to 1951, with special emphasis on the shifting industrial pattern it developed in each period of its history.

Particularly detailed are the years 1940, 1946-48, the post-war period, and the postwar period. The numerous charts and tables, compiled from official sources, make the volume valuable as a reference.

CAA Manual 105, the Flight Instructor Manual, prepared by CAA's Airman division. Available from the Superintendant of Documents, U. S. Government Printing Office, Washington 25, D. C., 164 pages, price \$1.50.

Prepared principally for instruction and student, the manual contains a good deal of information that is also of interest to pilots. The information was formerly restricted to five schools. Obsolete material has been discarded and new techniques and developments have been included. There is an appendix and a glossary of aviation terms.

Telling the Market

Cable containing over 75,000 possible combinations of bellows type expansion gauges and describing complete line of Safe Flight stall meters, bellows and assemblies may be had from Solar Aircraft Co., San Diego, Calif. — Fabricates for producing transformers and electronic and electrical equipment for defense manufacturers are developed by Arma Electronic Corp., of Cuba, N. Y. Ask for catalog M-108.

Aviocontamination is an attractive brochure printed in three languages available from Aviocontamination of Great Britain giving an idea of current progress of new and second-hand aircraft available in that country. The company handles plane distribution and spare parts with photos of planes most in demand, it also gives specifications. There is a listing of available radio and navigation equipment. Write Aviocontamination, Ltd., Gatwick Airport, Holey, Surrey, England.

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NOW SAFE FLIGHT BRACKETS THE PRE-STALL ZONE



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Why Air Power Costs So Much

Our representatives in Congress are showing increasing interest in getting our money's worth from defense appropriations. North American Aviation's Kordellenger and Alwood did a convincing job recently in testifying to a congressional subcommittee how aircraft production costs have risen since World War II. *American Week* summarized this testimony Aug. 27.

Robert E. Gross, Lockheed Aircraft's President, last week in an address before the American Bankers' Assn. made an impressive contribution on the same subject:

"Aside from the present-day elements such as labor and materials, no small part of the high cost of air power is traceable to the sins of the past," he said. "One out of six aircraft today is not high just because of the high cost of the things we are doing today, but, instead, because of the things we didn't do in 1945, 1946, and 1947."

"That's the trouble with our air program today—and it's the only absolute basic thing that is the matter with it."

This military aircraft business, Mr. Gross told the Bankers, is the longest manufacturing river in the world—the Mississippi of manufacturing, "and you can't get the big water out of the mouth if you shut it off at the source. And once you shut it off at the source, you can't suddenly turn it on and get the water out of the mouth of the river. It's got to flow just so fast and just so far and pick up its leaders along the way, and in the end you've got the big water flowing out at the mouth of the river."

So we shut off our airplane river and from August to September 1945 we dropped from 2,800 planes a month to less than 800 and in the summer of 1946 we were down to 66 planes a month.

Several days went by. Then suddenly someone discovered Russia had an air force. Where did they get it everyone asked. This is how they got it—they just didn't ever stop building the one they had, so we did.

So, Mr. Gross insists in 1946 we began to turn the water back into the stream. "But that shut-off in 1945 is now coming up the time and the big money...there's still a general and widespread lack of appreciation for the burning in aircraft production."

In 20 years between World War I and World War II, Mr. Gross points out, we spent an average of less than 25 million dollars a year for air craft, to find that to dig us out of World War II we had to spend 23 million dollars a day, and for more than four years.

"We spent an average of about 1½ billion a year in the years 1946, 1947, 1948. Now we're having to spend 17½ billion in just one year. And if conditions get worse, and if Sen. Lodge's proposal for a 150-engine Air Force were to be adopted, it would call for 32 billion in fiscal 1952, 27 billion in fiscal 1953, and 37 billion in fiscal 1954. That's what the fruit or future costs are."

When will the American people learn that studios in Hollywood—rather than economy in a crisis—is better and cheaper, Mr. Gross asks.

"Air power is expensive enough in itself, but when we add to it this insane cost of stopping and starting, we do two things. First, we run the cost up into the stratosphere, second, when we stop building we lay ourselves open to world attack—and the money we think we save in so-called fair weather, we have to quadruple to dig us out of foul. Studios rather than size in the pocket is the thing."

"These 30-billion-dollar-a-year costs would never occur if we kept up our good all the time, and it would cost only a fraction of the way we've been doing it for the last 30 years."

Ames, Mr. Gross. Ames.

Put Up or Shut Up

We optimists who think aviation can carry more passengers occasionally find that it has had a chance to prove an appalling Pan American Airlines' blunt warning that it will start regular low-cost coach service over the North Atlantic next April, whether other airlines of IATA do or not.

It may be strong and unpoliticized medicine, but the traffic committee of the International Air Transport Assn. needed a jolt to force action on North Atlantic traffic fares that it has been discussing languidly for years without any decision.

As long ago as 1948, Pan American notified its IATA fellow members that it was ready to start North Atlantic coach service.

The various meetings that have been held by IATA traffic committees over since have agreed with Pan American that the idea is good in principle. Nothing much more ever happened until the Bermuda meeting several months ago when the usual agreement in principle was suggested by a daring assertion that such service might start in the fall of 1952 with a fare to be set somewhere between \$225 and \$270. But the other day in London the traffic committee apparently was reflecting the dismal future so apparent everywhere in England and took no further action except to pick the proposed fare bracket up to \$275 to \$360 and to talk it all over again at the next meeting in November in Rome, France.

Of course, Civil Aeronautics Board and the State Department could put the brakes to Pan American's (first to try out the new service. But CAB already has indicated that it favors trans-Atlantic air coach, and it has said that the fall of 1952 is too late a starting date. Pan American feels confident that its announcement will finally force some action.

It says in effect, "Put up or shut up."

Shoptalk

AVIATION WEEK announced that Tom Self who has been serving as our sister McGraw-Hill magazine, *Business Week*, as Los Angeles correspondent, will represent *Business Week* full time effective Oct. 1. We hope to announce appointment of a new representative in the Southern California area in the near future.

—Robert H. Wood



The Bridge That Flew To Korea... Overnight!

All bridges across the Han River had been destroyed by retreating North Korean Communist armies, leaving up the United Nations advance. We needed to bridge the Han in a hurry.

Back in Japan, U.S. troops prepared a 250-ton, 600-foot pontoon bridge—in sections—to fit into the U.S. A.F. Command Cargo Command's Fairchild C-119s. Piece by piece, plane by plane, they flew

the bridge to Korea overnight!

Here again, Fairchild C-119's displayed unique versatility—under rigid military conditions. Battle scars, rough and rugged "Flying Boxcars" are still doing everything for the Army, Air Force and Marine Corps—personnel, trucks, ammunition, hospital equipment—even BRIDGES! It is the backbone of the airlift in Korea today.



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FOUR MORE RECORDS FALL TO G-E JETS

Thompson Trophy: A North American F-86 smashed the world's speed record for the 100-kilometer closed-course with a speed of 628.698. In warming up for the event, the jet also broke the closed-course record with a speed of 635.411.

Bendix Trophy: Another Sabrejet beat existing Muroc-to-Detroit records in winning the Bendix race with a speed of 553.761—averaging better than 25 mph faster than the previous record. The F-86 finished the race in a dive at sonic speed, after sustaining speeds of better than 650 mph over much of the course.

Chicago to Detroit: Four F-86s, averaging 672.189 mph, etched a new record in the skies from Chicago to Detroit, finishing the 237-mile course in less than 21 minutes.

Thompson Trophy: 628.698 MPH
Closed-course Record: 635.411 MPH
Bendix Race: 553.61 MPH
Chicago to Detroit: 21 minutes

Shattering existing records in every event in which they were entered, North American F-86 Sabrejets, powered by General Electric J47 jet engines, tallied a clean sweep at the National Air Races in Detroit.

Jet engines designed and developed by General Electric have set more records, powered more planes and flown more hours than all other jet engines combined. G-E leadership in the development and production of engineered systems and precision products for aircraft is available to you by contacting your nearby G-E office. *General Electric Company, Schenectady 5, New York.*

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